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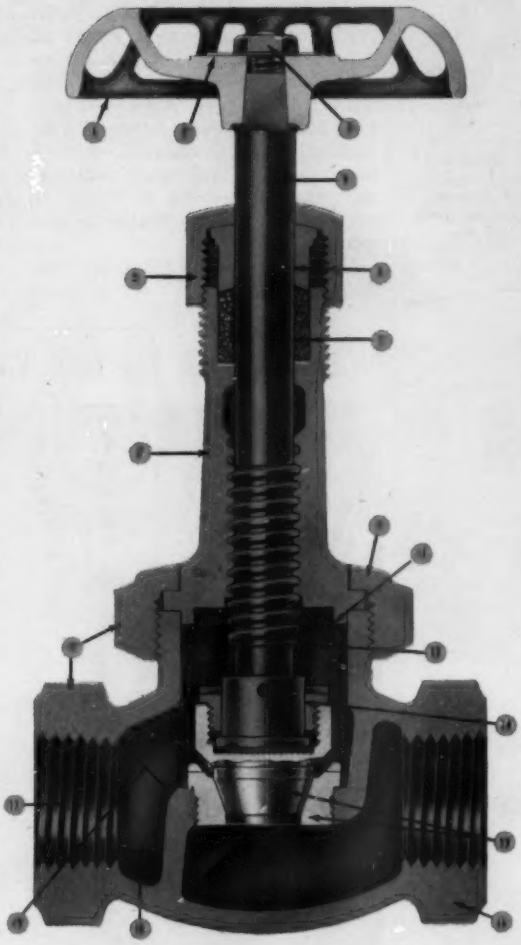

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Fire Fighting School

HERE IS A three-day training program that is specifically set up for the industrial fire fighter. The school is held at the experimental-testing grounds of American LaFrance where over six acres of land contain the necessary fire test buildings and classrooms.

Each man participates in discussions of the basic elements of fire protection and progresses to the actual use of all types of portable extinguishers on live fires. He is also instructed in the operation and servicing of fixed (piped) carbon dioxide, chemical foam, and airfoam systems. Each type is thoroughly explained and fire-demonstrated in order to establish its proper application to each special fire hazard.

Classes are conducted from May through October. Those still open for this year are: September 22, 23 and 24; October 6, 7 and 8; and October 13, 14 and 15.

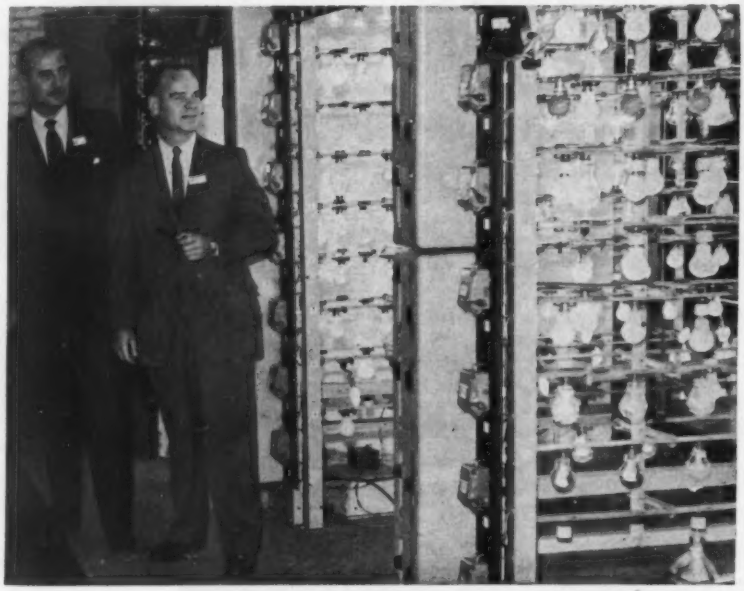
If you would like to send some of your men to one of these classes or those to be conducted next year, write to American LaFrance, Fire School, Elmira, New York.

Art Miller Retires— Holmgren New Plant Engineer

Arthur F. Miller, plant engineer at Johns-Manville Products Corporation, Waukegan, Illinois plant for 31 years, will retire on September 1, 1959.

He started with the company at their Milwaukee plant in 1922 and moved to Waukegan in 1923, when the operation was relocated there. In addition to his many plant engineering duties at the plant, he has been very active in the Northern Illinois

Our Electrical Editor, Vern Kempf, Visits European Facilities



John D. B. Ker, Imperial Chemical Industries, Johannesburg, South Africa, left, and Vern Kempf inspect lamp testing facilities of the General Electric Company Limited in London. Vern stopped in London for six days before attending the International Commission on Illumination meetings held in Brussels. The complete report of his European observations appears in this issue, page 134.

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'ROUND ABOUT

Chapter of the American Institute of Plant Engineers. He has held the offices of secretary-treasurer, vice president and president of the Chapter.

Carl Holmgren, who will take over Art Miller's duties has been with the company since 1946. He was hired as an assistant project engineer at

A. F. Miller

C. D. Holmgren

the company's General Plant Engineering Department at Manville, New Jersey. In 1949, he was transferred to the Waukegan plant and became the maintenance superintendent of the Industrial Products Division. When that division was reorganized in January, 1956, he was assigned as maintenance supervisor of the Industrial Insulations Division, and in May of that year was transferred to the Building Products Division as maintenance superintendent, which position he has held to date.

In replacing Arthur F. Miller, he will be responsible for plant services, including painters, construction, tinners, fitters, electricians and millwrights; maintenance of buildings, roads; production and distribution of power; the central machine shop; central receiving; property accounting; design and drafting rooms; experimental and development shops; storerooms; pump house; utilities; railroad maintenance and erection of new installations.

Holmgren is also a member of the Northern Illinois Chapter of the AIPE, a town councilman and chairman of the water commission of Gurnee.

Decimal Point on the Move In Construction Cost Series

APPARENTLY, along with death and taxes, the typographical error, too, is inevitable. We goofed, in Part 2 of "Construction Cost Estimating" appearing in August. On page 105, the cost of floor hardener is given as $1.44 per sq ft; actually, the decimal point slipped . . . it should read $0.144 per sq ft.

To compound the error, we piled all 70 lb of floor hardener onto one square foot of floor, instead of spreading it over the 100 sq ft that it will cover.

So, that line should read, "Floor hardener, 70 lb per 100 sq ft: add $0.144 per sq ft".

We're sorry the slips occurred and they will be corrected in the reprint version of the series. But, in case you find that the floor hardener costs more than the building, using our August figures, just divide the total by 10!

Joint Lubrication Conference

THE SIXTH Annual Conference on Lubrication, jointly sponsored by the American Society of Lubrication Engineers and the American Society of Mechanical Engineers, will be held at the Sheraton-McAlpin Hotel in New York City, on October 20 to the 22.

Twenty-six papers will be presented in seven sessions covering the general subjects of: Lubrication for Advanced Flight Vehicles, Metal Working, Rolling Contact Fatigue and Friction, Basic Friction and Wear, Properties of Lubricants, Hydrodynamic Bearings and Special Topics.

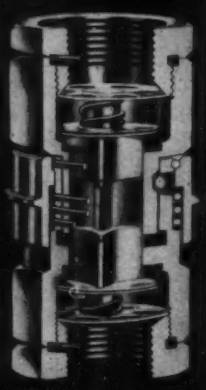
This conference is aimed primarily at those concerned with research and development in the fields of bearings, gears, seals and lubrication.

Further information about this conference may be obtained from the American Society of Lubrication Engineers, 5 No. Wabash Avenue, Chicago 2, Illinois.

Appointment at Du Mont

William H. Clark has been appointed general superintendent of Allen B. Du Mont Laboratories, Inc. He will be responsible for the company's plant and office facilities in Clifton, Passaic, and East Paterson, N. J. He succeeds **Walter H. Husselrath,** who died on May 25.

Mr. Clark has been associated with the company since 1945 in positions of increasing responsibility for plant equipment and maintenance operations. Before his new appointment he was maintenance superintendent for the company's plant at East Paterson, N. J.



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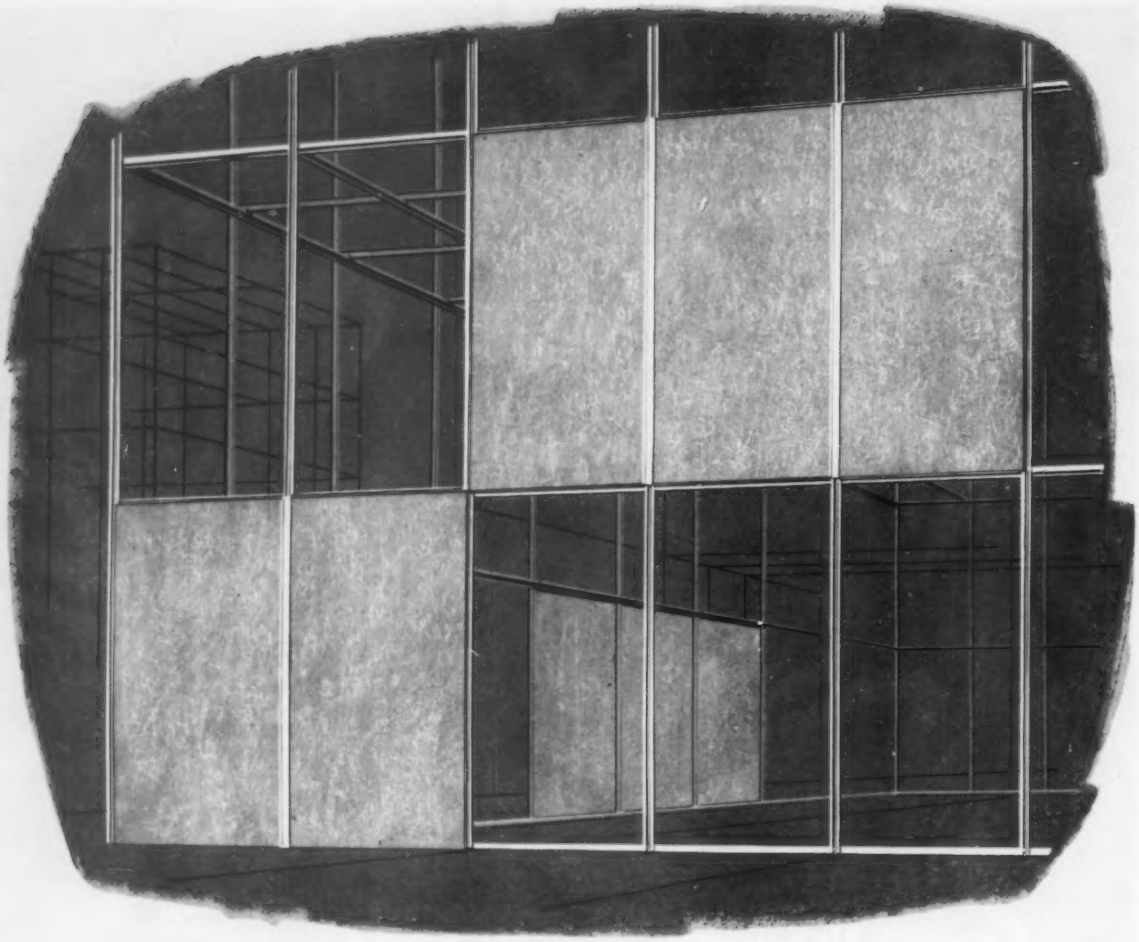

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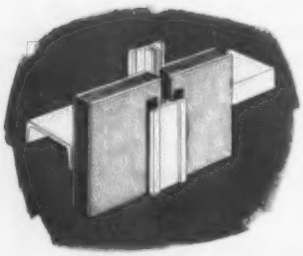

The above H & B aluminum molding is one of several attachment systems that may be used with Transitop.

Here are modern panel curtain walls that provide unusual durability and at the same time can save erection time and money.

Transitop panels are big—4′ x 8′ to 12′ and 11/16″ to 2″ thick. They cover large areas fast. They're rigid and strong, yet light in weight. Dead load is reduced—and framing can be lighter in construction. Once up, Transitop continues to prove its economies—it is virtually free of the need of any maintenance.

The reason is, Transitop consists of two surfaces of rock-hard, compressed asbestos and cement with an insulating core sandwiched between. It stands up to wind, sun and rain—gives no worries of expansion and contraction.

To see the many ways Transitop can help you in your construction—to see how easily it is erected, to learn of its economies—send for the illustrated brochure on J-M Asbestos Transitop—write Johns-Manville, Box 158, New York 16, N.Y. In Canada, Port Credit, Ontario.

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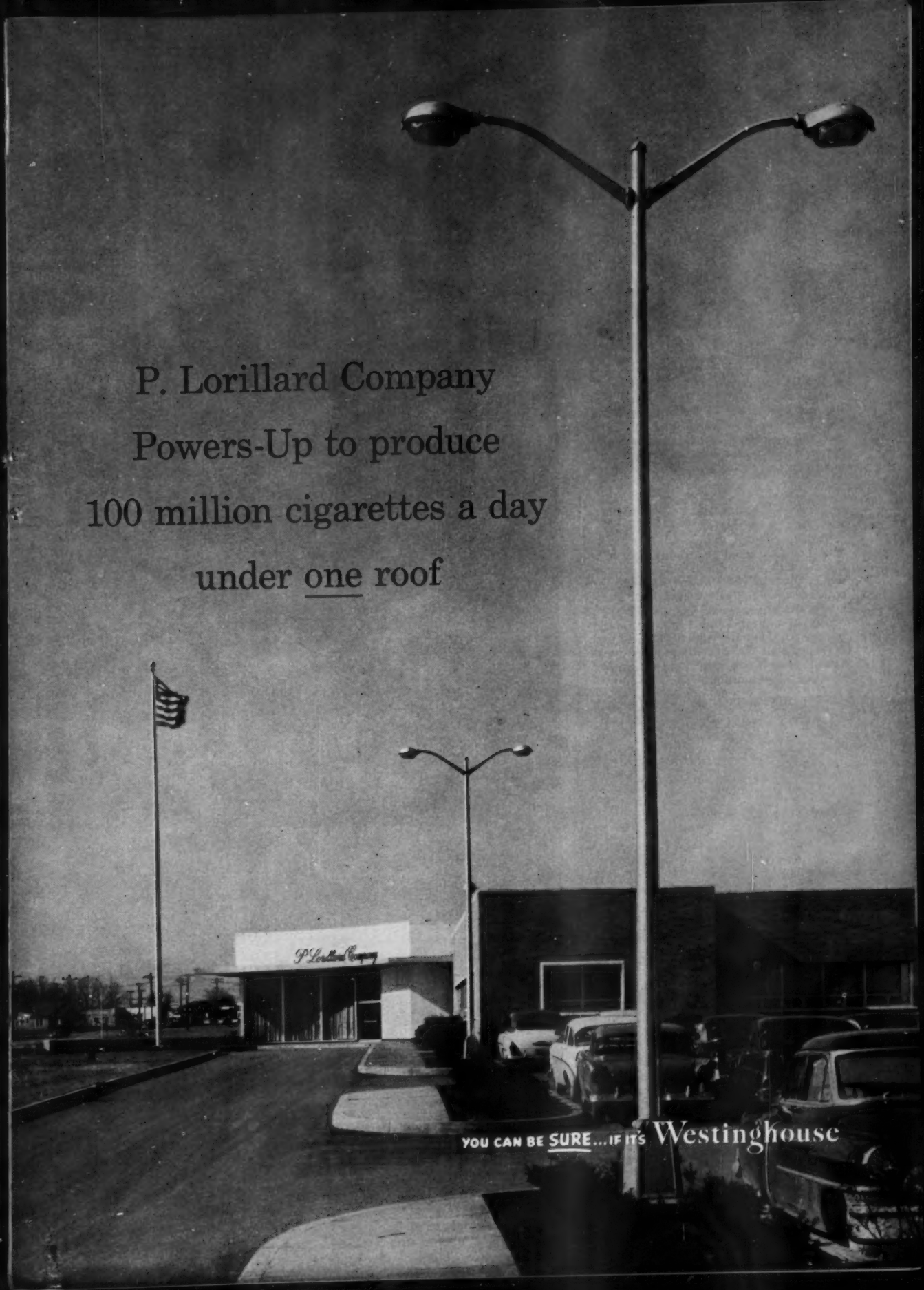
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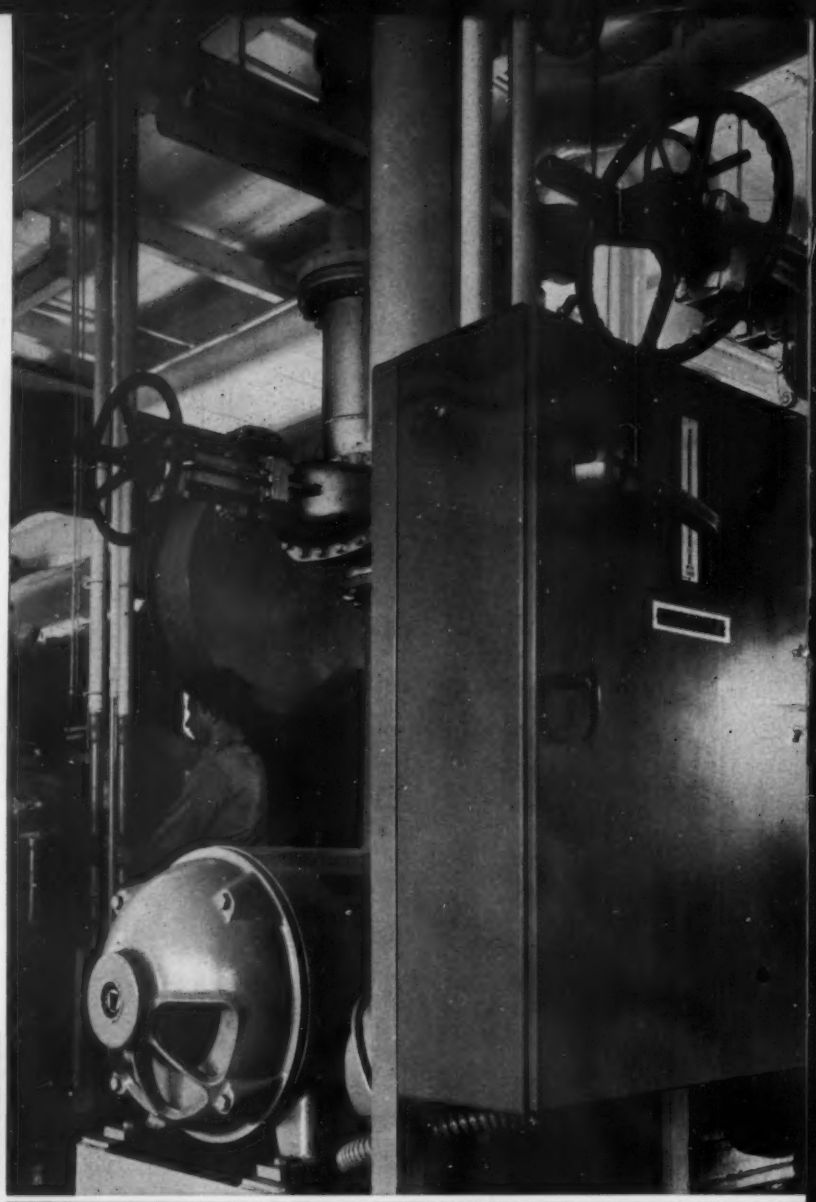
Powers-Up to produce
100 million cigarettes a day
under one roof
P. Lorillard Company
YOU CAN BE SURE... IF IT'S Westinghouse

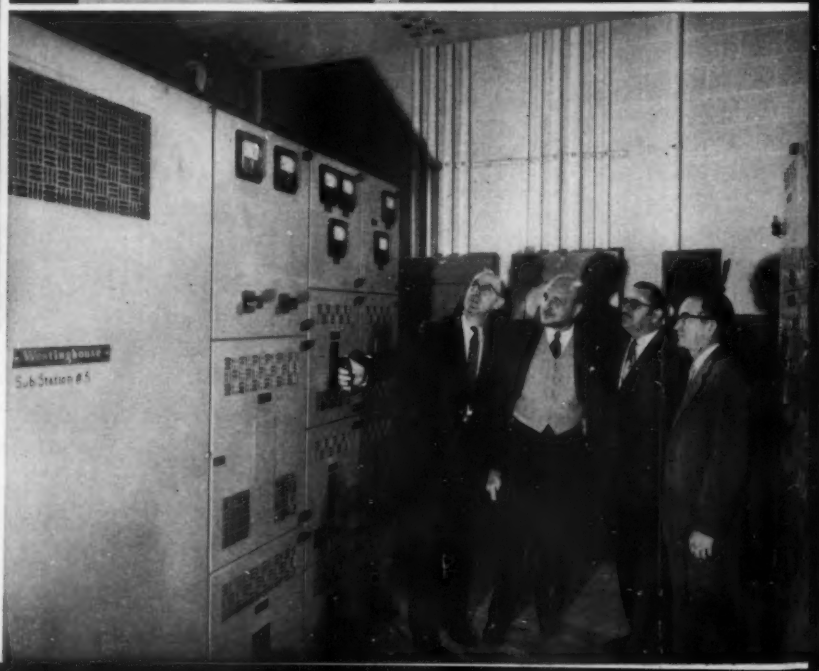
FRONT COVER

The completely new "electromated" Greensboro, N. C. branch of the P. Lorillard Co. is designed for tomorrow's expansion, both in power and plant layout, as well as for today's immediate production needs. Westinghouse type OV-20 outdoor lighting is used for the building approach and 650-car parking area.



▶ **A Westinghouse class 11-404 reduced-voltage starter provides automatic starting and protection for the Westinghouse Life-Line® 60-hp motor. The motor is part of a system which automatically controls the "man-made" climate, so necessary in the cigarette-making industry.**

▼ **A Lorillard maintenance man inspects the class 11-400 reduced-voltage starter which controls the 200-hp Life-Line air compressor motor supplying air to safeguard instruments. A 400-amp, 600-V, AHF-355 safety switch is shown in the background. On the wall (right) are two Westinghouse class 11-404 reduced-voltage starters providing protection for Westinghouse motors.**



▶ **O. B. Van Hise, Lorillard Plant Engineer; Wm. Folk, Jr., Westinghouse Sales Engineer; J. E. Guill of Starr Electric Co., Inc., Electrical Contractors and Engineers; H. L. Coble, H. L. Coble Construction Co., General Contractor, examine one of the plant's nine dry-type power centers. Power centers have spare circuit breakers plus blank cubicles equipped for future power needs. Overhead bus duct serves as tie-run between power centers.**

J-94115-2

Westinghouse electrical equipment used for today's production and tomorrow's expansion

P. Lorillard Company, the nation's oldest tobacco firm, is now occupying the newest and most modern cigarette manufacturing plant in the country. Relying heavily on Westinghouse equipment, the ultra-modern Greensboro, North Carolina plant is electrically powered to expand capacity or to shift emphasis from filters to non-filters (or vice versa) almost overnight.

The plant is unique in the tobacco industry not only in design, but because it represents many departures from standard industry procedure. In some instances, departures were so great that new, complex machinery was designed and built.

Power is transmitted to the completely "electromated" plant at 22,000 volts and stepped down by Westinghouse transformers to 12,500 volts and distributed to nine power centers throughout the plant. These network power centers distribute 480/277 volts and are interconnected to avoid shutdown in the event of a partial power failure.

Lorillard minimized human error and bolstered production by installing Westinghouse-driven and controlled automatic feeder-conveyors to move the processed tobacco in a steady flow above cigarette-making machines, feed it into the machines and automatically maintain the precise level of tobacco in hoppers. This system assures uniform filling and quality of every cigarette.

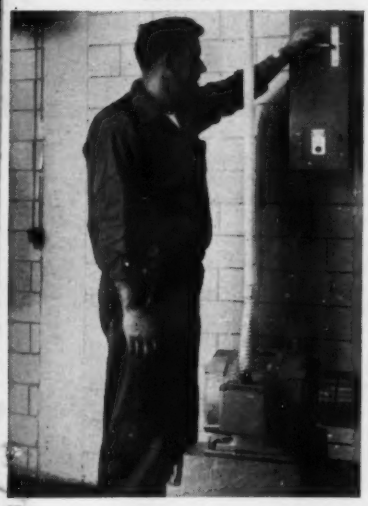
In addition to the substation transformers and electrical equipment for the conveyor system, Westinghouse supplied the power centers, motors and controls for the air conditioning system and outdoor lighting for the building approach and plant parking area.

Westinghouse, working with the architect-engineer, general contractor, electrical contractor and Lorillard engineers, had an active part in equipping this plant with the electrical distribution system and with other electrical components required to assure uninterrupted operation and provide for anticipated expansion. Westinghouse can help with

(cont'd)

S *Over 250 pages Westinghouse data in Sweet's Construction File*

J-94115-3

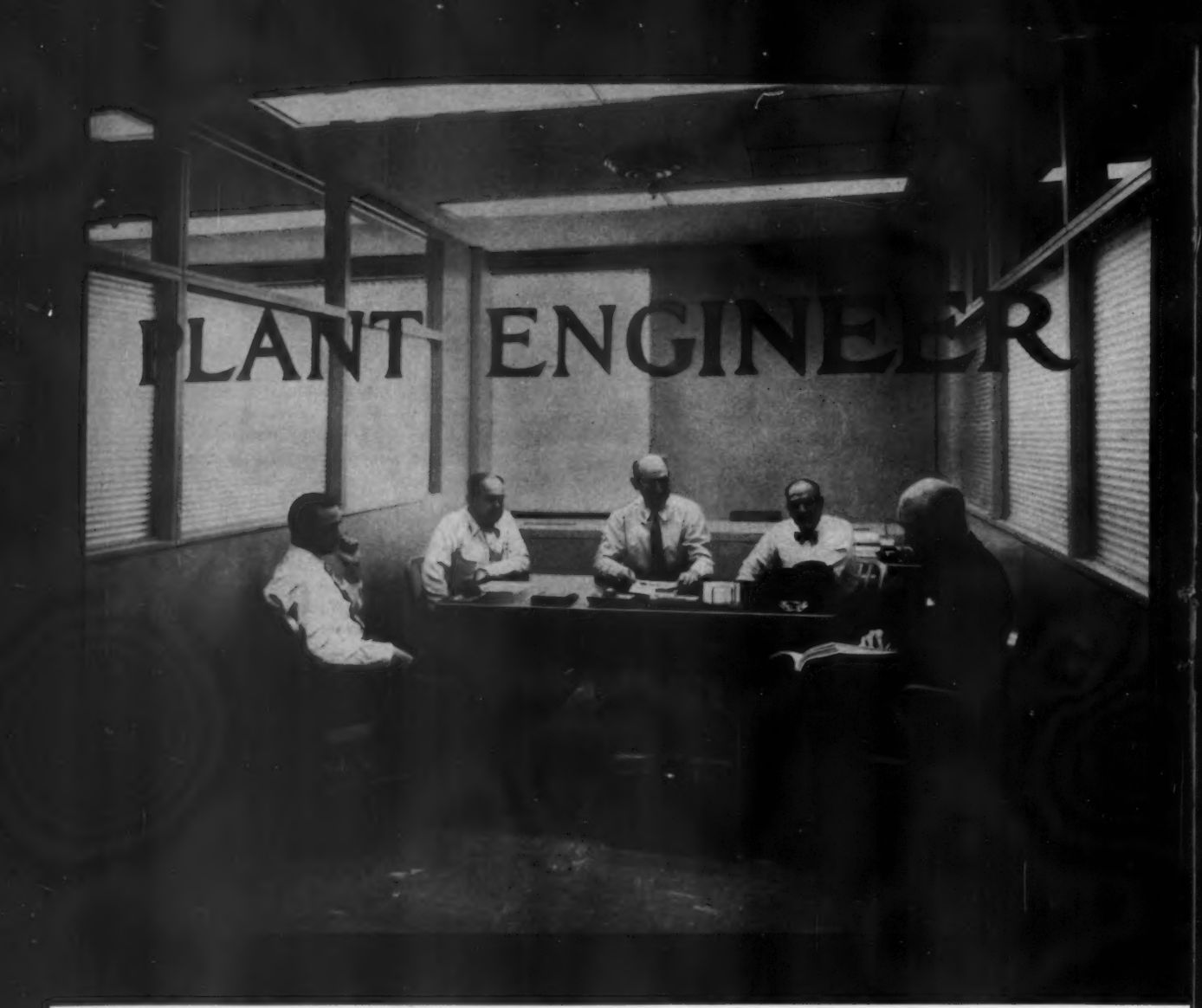


This Life-Line class 11-204 motor starter, with fusible disconnects, which activates the Westinghouse 3-hp Life-Line "A" motor to drive a 75-gpm pump, is located in the mechanical equipment room of the ultra-modern plant.

Westinghouse class 11-204 combination magnetic motor starters with fusible disconnects provide remote control and protection for Life-Line "A" motors located throughout the conveyor system. Equipment is designed to move tobacco from hogshead to finished cigarette without being touched by human hands.

Straight-line feeder-conveyor system continues through automatic cigarette-making, packing, cartoning and shipping. Westinghouse automatic controls, pushbuttons and switches "spot control" the conveyor process.

YOU CAN BE SURE...IF IT'S Westinghouse



Specially designed for tomorrow's expansion

any phase of your electrical planning and construction. See your Westinghouse distributor, or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94115-4

Owner: P. Lorillard Company, New York, N. Y.
Architect-Engineers: Lockwood Greene Engineers, Inc.
General Contractor: H. L. Coble Construction Co.
Electrical Contractor: Starr Electric Co., Inc.
Westinghouse Distributor: Westinghouse Electric Supply Co., Greensboro, N. C.

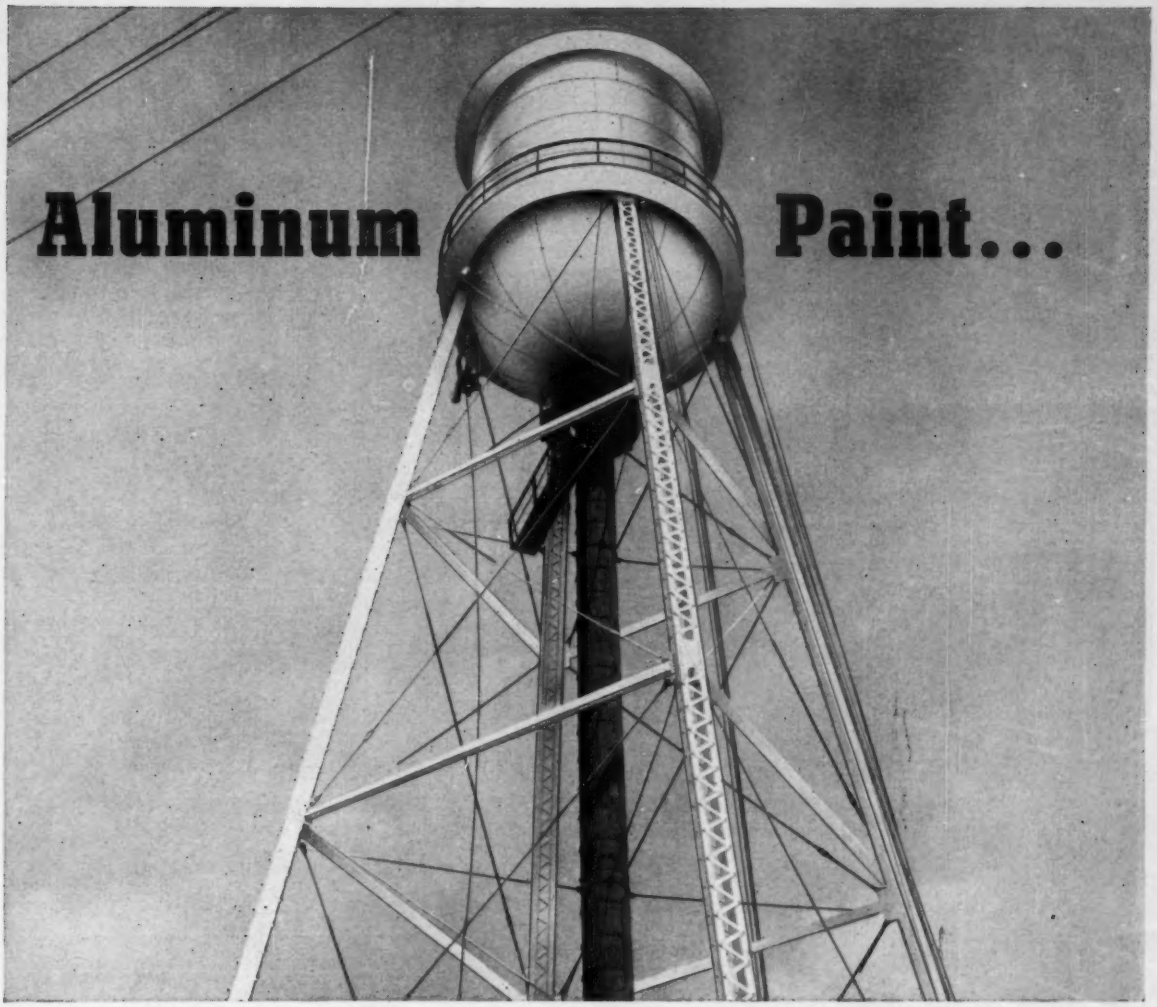
New complex machinery had to be designed and built by Lorillard to achieve this highly automated plant. J. Berner, Project Engineer, conceived, planned and built much of the special equipment. (Both Berner and R. H. Jobe, Lorillard Draftsman, sport beards in honor of Greensboro's 150th anniversary.)

For more facts circle 507 on Reply Card

Wm. Folk, Jr. (right) explains the full line of electrical equipment carried by Westinghouse distributors for immediate delivery. This reduces the inventory Lorillard must carry for replacement needs. Others shown left to right: W. D. Rhea, Power Engineer; M. W. Breitmeier, Plant Maintenance; O. B. Van Hise, Plant Engineer; J. Berner, Project Engineer; all of Lorillard Plant Engineering Section.

YOU CAN BE SURE...IF IT'S

Westinghouse



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REYNOLDS ALUMINUM

Watch Reynolds TV shows—"ALL-STAR GOLF" and "ADVENTURES IN PARADISE"—ABC-TV

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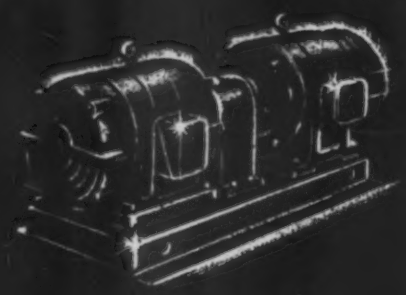
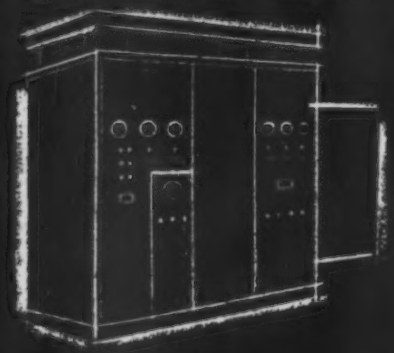
1 Precise high-frequency drives for generators or converters



Because of its exact speed characteristic, the Syncro-Spede is an ideal driver for high-frequency generator sets where precise frequency is a necessity. The elimination of slip provides exact frequency throughout the entire load range of the motor.

2 Precise timing, metering, and recording devices



Syncro-Spede delivers and maintains exact synchronous speed within rated capacity regardless of load or line voltage dips. Its design permits mechanical modifications to meet special needs. Since it eliminates error caused by speed fluctuations, this new Louis Allis motor is also ideal for memory drums and precision timing devices.

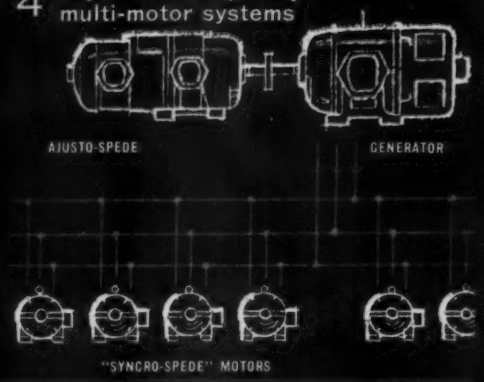
3 Constant single- or multi-speed conveyor drives

Syncro-Spede gearmotors can provide exact constant conveyor speed — or maintain correct relation of several conveyors operating at different speeds. Used with Louis Allis gear drives, the Syncro-Spede offers a practical, low-cost solution to low-speed conveyor drive requirements —down to 7.5 rpm.

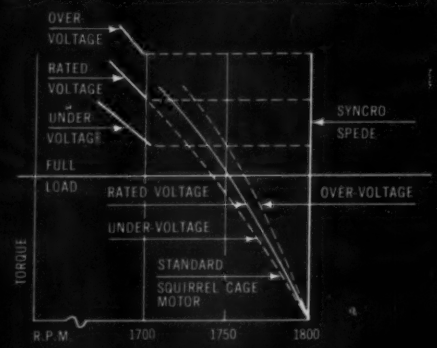
Below values are typical values based upon 100% pull-in torque with the external inertia equal to no more than twice the rotor inertia. To obtain full load and locked amps for other standard low voltages, multiply below 220 volt values by the inverse ratio of the voltages. For applications with high external inertias, refer to factory with specific inertia values.

HP	Synch. RPM	Frame Size	Full Load Amps 220 V.	% Locked Rotor Torque	Locked Amps 220 V.	Full Load Power Factor	Full Load Efficiency	Rotor WK²
1	1800 1200	182 184	4.4 4.6	275 200	30 30	59 58	76 75	.18 .22
1.5	1800 1200	184 184	6.6 7.0	265 200	41 41	59 58	76 75	.18 .24
2	1800 1200	184 213	7.7 8.3	250 200	58 58	64 62	82 78	.22 .49
3	1800 1200	213 215	11 14	250 200	83 83	67 61	82 78	.49 .80
5	1800 1200	215 254U	17 21	200 175	120 120	68 61	85 82	.80 1.30
7.5	1800 1200	254U 256U	25 28	200 175	170 170	68 62	86 83	1.30 1.80
10	1800 1200	256U 284U	34 36	200 175	240 240	68 63	85 83	1.80 3.50
15	1800 1200	284U 326U	49 54	200 165	330 330	70 63	86 84	3.0 5.50
20	1800 1200	286U 326U	63 65	200 150	420 420	70 64	87 85	5.00 5.50
25	1800	324U	79	200	520	70	87	6.0
30	1800	326U	95	200	700	70	88	7.0

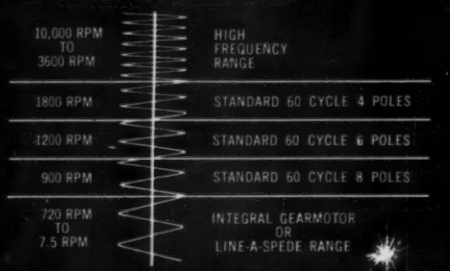
4 Adjustable frequency multi-motor systems



5 Any constant speed requirement



6 High speed — high frequency operation

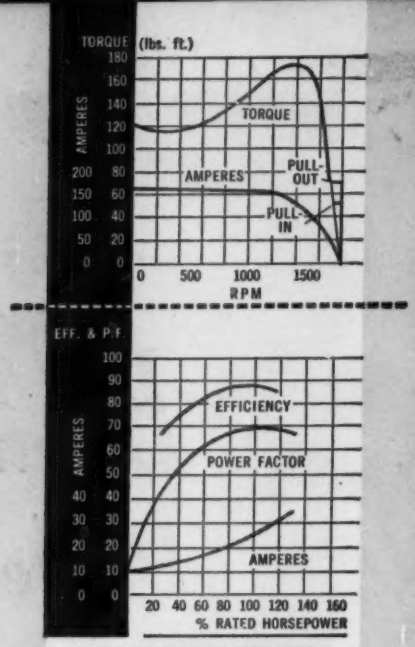


Syncro-Spede motors of different ratings and output speeds can be synchronized from a single adjustable frequency source — motors of various speeds will hold their exact relationship within an operating frequency range of 5 to 1,000 cycles. This combination provides precise adjustable frequency power for many applications in the printing, paper, plastic, and textile industries.

The Syncro-Spede offers virtually unlimited usage. It is much smaller than equivalent reluctance and DC excited synchronous motors—outperforms both and costs less. Under full load conditions, a standard squirrel cage induction motor may vary between 1740 and 1760 rpm with a 10% voltage variation — the Syncro-Spede maintains exact synchronous speed.

Syncro-Spede's indestructible cast aluminum rotor is designed for high-speed — high frequency operation. The small diameter rotor enables the motor to attain speeds previously impossible with other types of synchronous motors. With special rotor designs, the Syncro-Spede can reach speeds of 10,000 rpm and higher.

New-product news from Louis Allis



IMPROVED PERFORMANCE DATA

The Louis Allis Syncro-Spede

...a synchronous motor built in the same NEMA frames as standard motors of equal horsepower!

It's compact, simple, versatile...and trouble-free!

The remarkable Louis Allis Syncro-Spede® Motor enables you to provide exact synchronous speed for *any* application for less cost — with fewer controls — and in less space than previously possible.

If your equipment or operation calls for precise constant speed, check the advantages this new motor offers you:

***Space-saving design* — The revolutionary Syncro-Spede needs no external excitation, wound rotating fields, collector rings or brushes. It's built in the same standard NEMA frames as ordinary induction motors of equal horsepower. It requires less space — is virtually maintenance-free.**

***Wide range of enclosures* — The Syncro-Spede can be provided in a wide variety of enclosures to meet special operating requirements. For example, Syncro-Spede is readily available in totally-enclosed fan-cooled and explosion proof enclosures — thus permitting installations which were difficult to make with D.C. excited synchronous motors.**

***Unmatched versatility* — Syncro-Spede is available in standard sizes up to 100 hp, and even larger ratings for special applications. It can also be furnished in a wide range of mechanical modifications . . . base- or flange-mounted — as a gearmotor or brakemotor — even as a rolled-shell shaftless motor for "built-in" applications.**

For full particulars and expert application engineering help, contact your local Louis Allis District Office. Or write for Bulletin No. 1900 to The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

Syncro-Spede is a Trademark of The Louis Allis Company

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

For more facts circle 509 on Reply Card

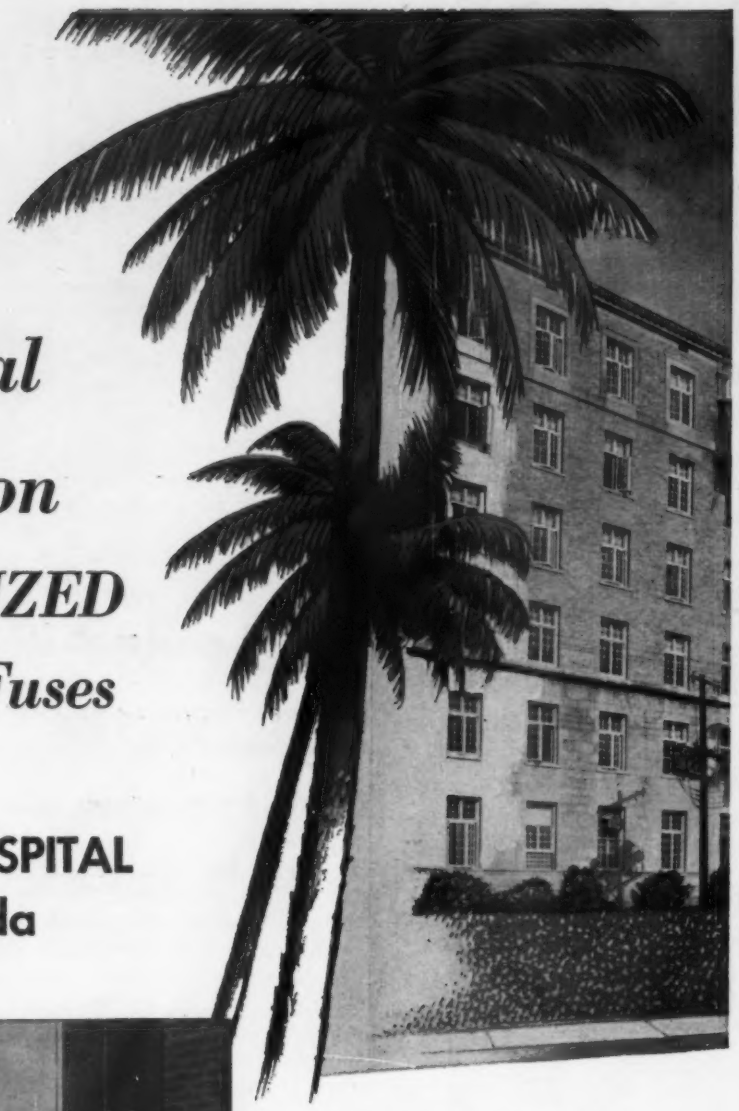
LOUIS ALLIS

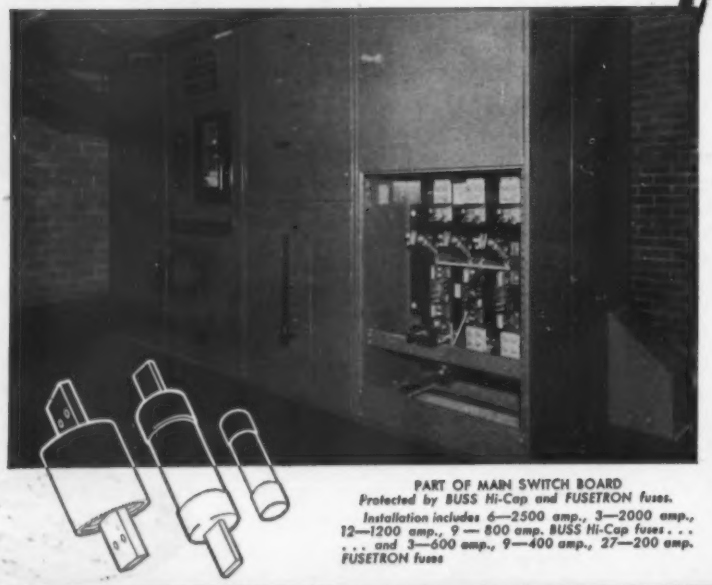
LA-340

Electrical Protection is MODERNIZED with BUSS Fuses

in the

TAMPA CITY HOSPITAL
Tampa, Florida





PART OF MAIN SWITCH BOARD
Protected by BUSS Hi-Cap and FUSETRON fuses.
Installation includes 6—2500 amp., 3—2000 amp., 12—1200 amp., 9 — 800 amp. BUSS Hi-Cap fuses . . . . . and 3—600 amp., 9—400 amp., 27—200 amp. FUSETRON fuses

In this beautiful hospital, tremendous in size, it was found necessary to increase the capacity of the electrical system to meet today's requirements. Modernization of the electrical system resulted in estimated available fault currents of 150,000 amperes.

With faults of this magnitude possible, it became essential that a superior type of protective device be used.

So in the main switch board are BUSS Hi-Cap fuses and FUSETRON dual-element fuses, both applied to give the interrupting capacity and dependability needed on the circuits they protect.

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION

ARCHITECTS AND ENGINEERS: *Norman F. Six and Elliot C. Fletcher, Tampa and Schmidt, Garden and Erikson, Chicago*

CONTRACTOR: *Miller Electric Co., Jacksonville, Fla.*

WHY HIGH INTERRUPTING CAPACITY IS NEEDED

Fault currents of 75,000 or 150,000 amperes were unheard of a few years ago, — but today they are quite possible. With the generating capacity of utilities increasing yearly, most likely the magnitude of fault currents will be higher in future years.

BUSS Hi-Cap and FUSETRON dual-element fuses have an interrupting capacity designed for today's conditions and to anticipate system growth.

The interrupting rating of BUSS Hi-Cap fuses is 200,000 amperes rms symmetrical — and for FUSETRON fuses it is 100,000 rms symmetrical.

WHY DEPENDABILITY IS NEEDED

With higher fault currents available, the dependability of the protective device becomes of increasing importance.

The protective device should be just as accurate in 10, 15, or 20 years, as it is on the day installed.

A fuse is the only type of protective device to offer this advantage. A fuse must remain safe and accurate, as its operation depends on a simple thermal law. A fuse has no triggers, latches, pivots or contacts to stick or get out of order. Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time.

for more information

On FUSETRON dual-element fuses - (loads of 0 to 600 amps.) - *write for bulletin FIS*

On BUSS Hi-Cap fuses - (loads above 600 amps.) - *write for Bulletin HCS*

BUSSMANN MFG. DIVISION, McGraw-Edison Co. **ST. LOUIS 7, MO.**

For more facts circle 510 on Reply Card

WEATHERHEAD

offers one source for all tube fitting needs... a complete line of flared, flareless or pipe....

TUBE FITTINGS of BRASS, CARBON or STAINLESS STEEL

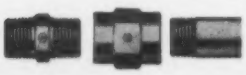
BRASS FITTINGS

S.A.E. 45° FLARE
USED with copper, brass, aluminum, steel and plastic tubing. PRESSURE RATINGS up to 5000 p.s.i. **Sizes: ⅛" to ¾".** Also available in 37° heavy pattern brass. Listed by U.L.; approved by A.G.A. Meets specs of S.A.E. Hydraulic Tube Fittings Standards and A.S.A. and A.S.M.E. codes for instruments and control piping.

COMPRESSION
USED with copper, brass, aluminum and plastic tubing. PRESSURE RATINGS up to 2000 p.s.i. **Sizes: ⅛" to ¾".** Listed by U.L.; approved by A.G.A. Meets specs of S.A.E. Hydraulic Tube Fittings Standards and A.S.A. and A.S.M.E. codes for instruments and control piping.

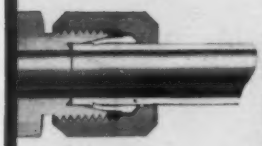
SELF-ALIGN®
No flaring, soldering, welding—insert tube and tighten nut. USED with copper, brass, aluminum and plastic tubing. PRESSURE RATINGS up to 2000 p.s.i. **Sizes: ⅛" to ¾".**

INVERTED FLARE
USED with copper, brass, aluminum, steel, Bundyweld and plastic tubing. PRESSURE RATINGS up to 3000 p.s.i. **Sizes: ⅛" to ¾".** Listed by U.L. Meets specs of S.A.E. Hydraulic Tube Fittings and A.S.A. and A.S.M.E. codes for instruments and control piping.

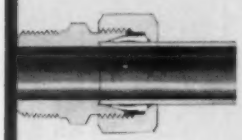


PIPE
USED with brass or steel pipe. PRESSURE RATING: up to 5000 p.s.i. **Sizes: to 2".** Meets specifications of S.A.E. TPHL Fittings Committee.

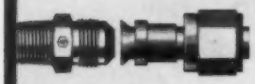
FORGED STEEL FITTINGS



"7000" SERIES ERMETO®
U.L. listed. Meets J.I.C. standards. S.A.E. approved "O" Ring boss design. Dryseal pipe thread. Needs no flaring. Available in either carbon or stainless steel. Carbon steel fittings have "Weathercoat" or cadmium-plate finish. PRESSURE RATINGS: up to 10,000 p.s.i. **Size Ranges—⅛" through 2".**



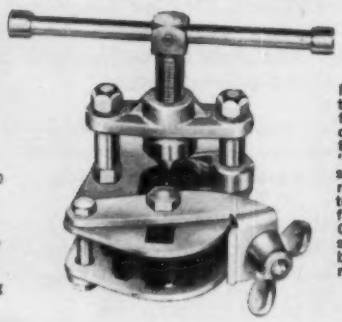
"8000" SERIES ERMETO®
Listed by U.L. for use with hazardous liquids, fuel equipment, refrigeration and gas; meets specs of S.A.E. and J.I.C. hydraulic tube fitting standards. Supplied as standard in cadmium-plated carbon steel and in stainless steel. Requires no flaring. PRESSURE RATINGS: up to 10,000 p.s.i. **Size Range—⅛" through 2".**



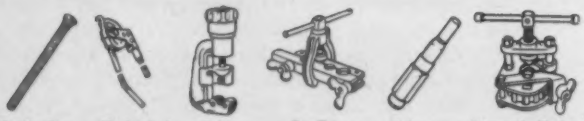
FLARE-TWIN—(2-pc. or 3-pc.) 37° FLARE STEEL TUBE FITTINGS
Listed by U.L. S.A.E. and J.I.C. approved. Used with J.I.C. and other soft steel tubing; also with copper, aluminum, and fully annealed stainless steel tubing. Meets S.A.E. standards for straight thread boss mounting. PRESSURE RATINGS up to 10,000 p.s.i. **Sizes: ⅛" through 2".**

FLARE-TWIN
Made in 3-piece and 2-piece assemblies. 2-piece type offers price advantage. "Weathercote" or cadmium-plate finish.

FAST! EASY! ACCURATE TUBE WORKING TOOLS



New rotary flaring tool for perfect tube flaring. Fast . . . one piece construction. Easier . . . "Dial - Matic" tube size selection. Accurate...tube stop automatically controls flaring diameter. Compact . . . easy to store. Available with burnishing attachment.



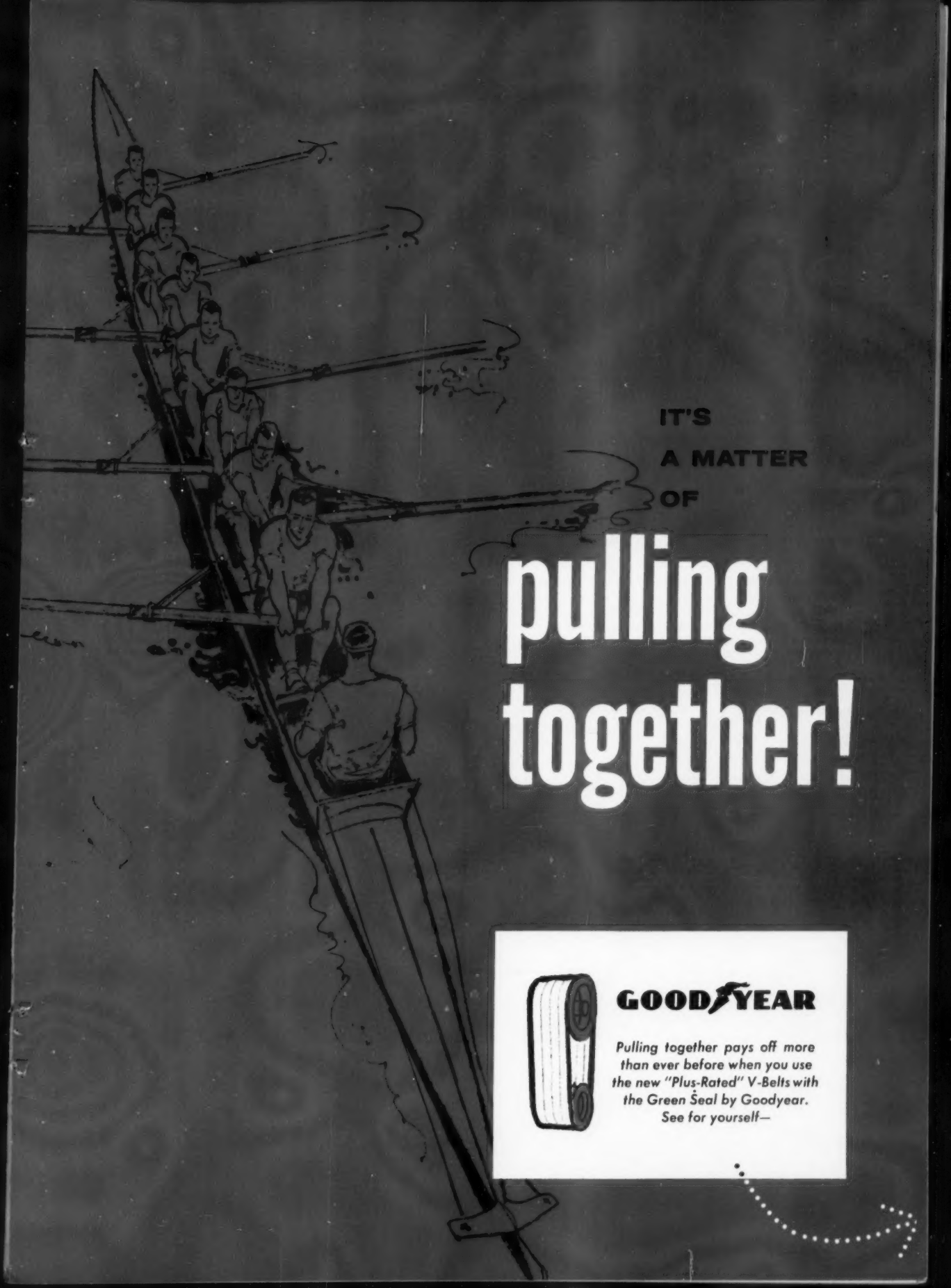
Spring-Type Bender | Mechanical Bender | Tube Cutter | Bar-Type Flaring | Tube Swaging | Automatic Flaring Rotary

THE WEATHERHEAD COMPANY

FORT WAYNE DIVISION • Dept. PL-9, 128 West Washington Blvd., Fort Wayne, Indiana

For more facts circle 511 on Reply Card

For more facts circle 512 on Reply Card ⟶



IT'S
A MATTER
OF

pulling together!

GOODYEAR

Pulling together pays off more than ever before when you use the new "Plus-Rated" V-Belts with the Green Seal by Goodyear. See for yourself—

Year after year—at plant after

Goodyear V-Belts with

the toughest jobs—at the lowest cost

—IN AN ILLINOIS GARAGE EQUIPMENT PLANT

Operation: Finishing surfaces of cylinders used on automobile lifts

Drive: Oily main drive of heavy-duty cylindrical grinder

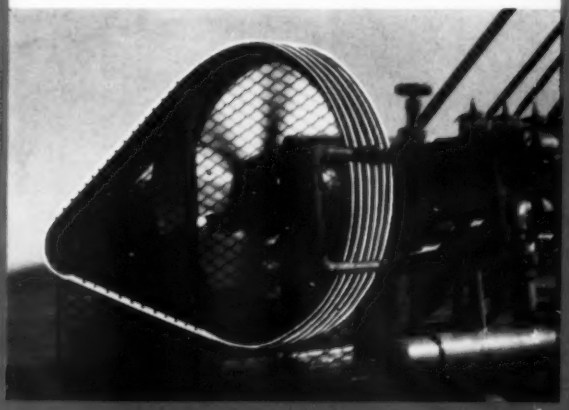
Service: Set of 5 matched oil-resistant V-Belts with the Green Seal pulled together to give user 6 times the service of previous belts

—ON TEXAS WATERFLOODING PUMPS

Operation: Pressure-pumping salt water into "tired" oil wells to reactivate them

Drive: 15 h.p. pump drive that feeds salt water into wells under 600-900 psi pressure

Service: Five-belt set of V-Belts with the Green Seal pulled together, eliminating slippage problem caused by previous belts and averaging 2 years' service where others had failed in 6 months



—and now they're "Plus-Rated" for greater

plant–on drive after drive–

the Green Seal handle

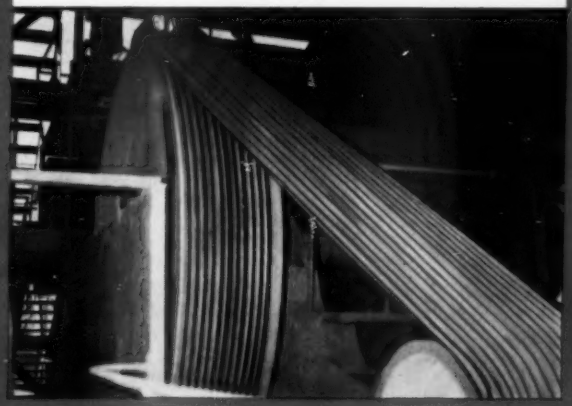
–over the longest trouble-free life–

–AT AN OREGON LUMBER MILL

Operation: Debarking giant logs
Drive: 25 h.p. 900-1800 r.p.m., 2-speed main drive on barker
Service: Matched V-Belts with the Green Seal–five to the set–pulled together and outlasted previous belts 14 to 1–eliminating down time–saving $40 a month to boot

–ON A PENNSYLVANIA ROCK CRUSHER

Operation: Crushing dolomitic limestone
Drive: Main drive on bulldog-type rock crusher
Service: Set of 14 matched V-Belts with Green Seal construction pulled together to crush 600,000 tons of limestone a year for 14 straight years–was still going strong at last report



horsepower-transmission per dollar!

HERE'S THE STORY .....

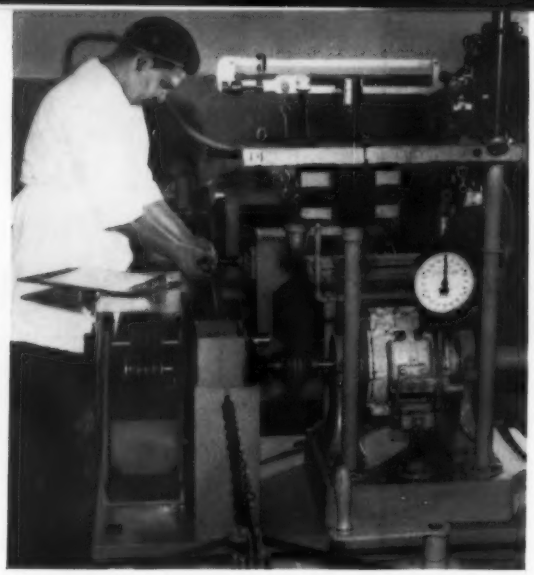
New

"Plus-Rated" V-Belts

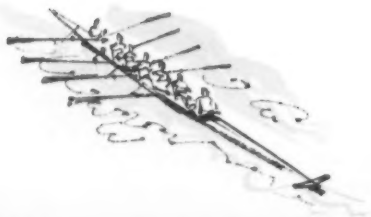
with the

Green Seal

give you all these "pluses"



- Bonus horsepower ratings at no extra cost
- Maximum horsepower hours per dollar of any belt you can buy
- Matched V-Belt sets that *stay* matched in storage—on the drive
- Unequaled stretch-resistance – thanks to high-modulus construction with load-carriers of airplane-type steel cable or 3-T cord
- Smooth-running uninterrupted performance with specially compounded non-dusting rubber covers that never stick in the grooves
- Maximum resistance to shock-loads—guaranteed by breaking-point tests that exceed the strain of severest service



—Add up all these plus features and you'll see why the new "Plus-Rated" V-Belts with the Green Seal are your best belt buy for longer-than-ever, more-trouble-free service at lower-than-ever cost. For details, contact your Goodyear Distributor—or clip, fill in, and mail the coupon below.

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

"PLUS-RATED" V-BELTS WITH THE GREEN SEAL BY

GOODYEAR

THE GREATEST NAME IN RUBBER

S-51165-X

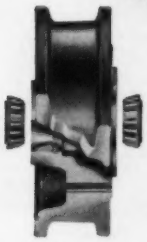
THE GOODYEAR TIRE & RUBBER COMPANY, Industrial Products Division, Dept. 794, Akron 16, Ohio
Please send me more information on the great new "PLUS-RATED" V-Belts with the Green Seal.

Name _____

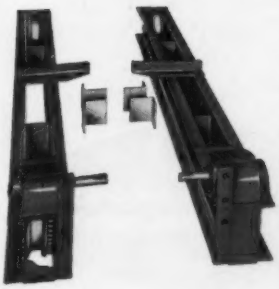
Company _____

Street Address _____ City _____ Zone _____ State _____

It Costs Far Less to Build a Crane Locally from Wright Matched Components!



TREAD WHEELS
Made of special car wheel iron with the tread deep chilled to a hardness of 450-500 Brinell. Tapered tread is self-aligning.



END TRUCKS
Welded steel channel construction with heavy steel plate diaphragms. Squaring shaft of ground and polished steel.

CRANE DRIVE UNIT
Consists of electric motor and well-proportioned gear reduction. Solenoid "drag" brake. Size 1—motors up to 2 HP. Size 2—3 or 5 HP motor.

• Now, buy a dependable WRIGHT B-514 Top Running Single Bridge Crane the modern, money-saving way! Here's all you do! Instead of paying shipping costs on a complete crane, order only the matched components—end trucks, crane drive unit, trolley hoist—from the WRIGHT factory. Then, buy heavy I-beam structurals from a local source. This way you realize big savings by greatly reducing freight charges. In addition, WRIGHT also furnishes you with detailed plans for assembly, including a list of essential structural components to be bought locally.

A FEW OF THE WRIGHT B-514 FEATURES:

Controls • Single-speed push button controls are furnished with fluid-drive models, variable-speed push button controls with models without fluid drive. Variable speed controls have five selective speeds for speeding and slowing crane travel.

Fully Integrated Electrical Controls for the B-514 assembled locally with a WRIGHT Hoist and WRIGHT Crane Drive Unit are factory-installed at no extra charge.

Two Timken Roller Bearings to each wheel. Placed in opposition to one another, they compensate for radial and thrust loads.

Complete information about the WRIGHT B-514 Crane and other WRIGHT products is available by writing our York, Pa., office.

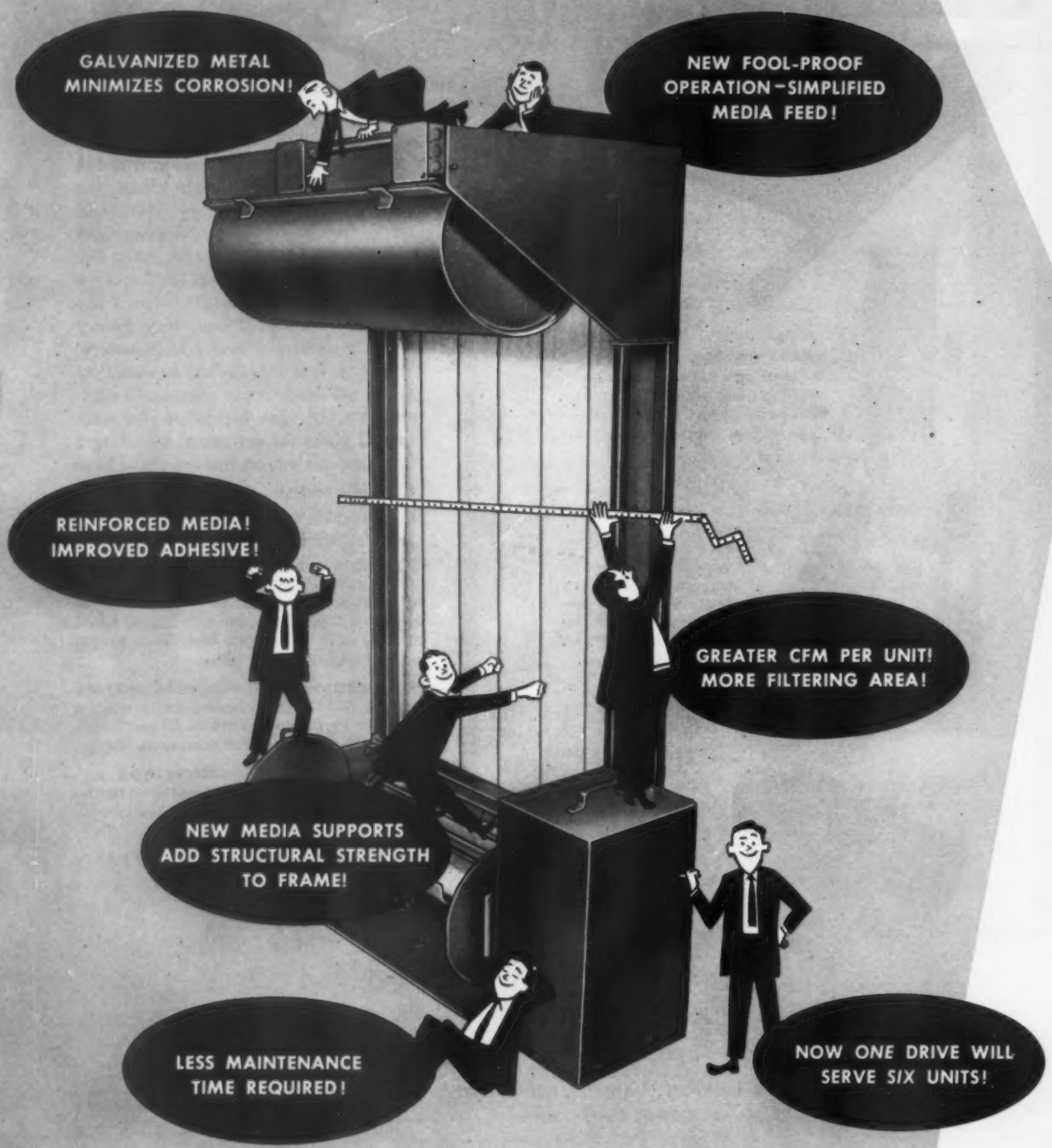
WRIGHT CRANES

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 513 on Reply Card

NEW! AAF model B


GALVANIZED METAL MINIMIZES CORROSION!
NEW FOOL-PROOF OPERATION–SIMPLIFIED MEDIA FEED!
REINFORCED MEDIA! IMPROVED ADHESIVE!
GREATER CFM PER UNIT! MORE FILTERING AREA!
NEW MEDIA SUPPORTS ADD STRUCTURAL STRENGTH TO FRAME!
LESS MAINTENANCE TIME REQUIRED!
NOW ONE DRIVE WILL SERVE SIX UNITS!

Roll-O-MATIC® AIR FILTER!

RETAINS *ALL* THE FEATURES of the amazing AAF Roll-O-Matic that have led to installation of thousands of sections at 2,100 locations since 1954—totalling more than 100 million cfm!

- Clean air by the roll!
- As simple to service as a roll-fill camera!
- Infrequent maintenance!
- No oil or water for washing!
- High cleaning efficiency!
- Large dust-holding capacity!
- Fully automatic!
- Simple disposal of used media!
- Notifies operator when needing attention!
- Low power requirements!

and offers *these* big IMPROVEMENTS

✓ **Stronger MEDIA!** Unique Roll-O-Matic filtering media is now reinforced for greater strength. New adhesive (1) won't "run" in high temperatures, (2) won't thicken in low temperatures, and (3) won't lose adhesive qualities due to dryness.

✓ **Simpler OPERATION!** Positive drive for introducing new media and re-winding used media. Minimum of moving parts.

✓ **Easier MAINTENANCE!** Non-corrosive frame, simpler operation, stronger media, better adhesive, re-location of drive all add up to fewer maintenance headaches.

✓ **Greater CFM!** Now, more media area, more CFM per filter! New design provides maximum effective filtering area per unit.

✓ **Rugged, heavy-duty DRIVE!** Drive is now on service side of unit for easier accessibility. Fractional hp. drive will serve six units of maximum standard height and width. Means big savings in first cost, installation, and operation.

✓ **Corrosion-resistant CONSTRUCTION!** The Model B Roll-O-Matic is constructed of galvanized metal . . . minimizes corrosion problem. New media supports add to structural strength of frame in addition to serving as media guides.

Write today for new Roll-O-MATIC Bulletin 248-C! Address: Mr. Robert Moore, American Air Filter Co., Inc., 228 Central Avenue, Louisville 8, Ky.

AAF American Air Filter

BETTER AIR IS OUR BUSINESS

For more facts circle 514 on Reply Card

New Super Coilife gives rewound motors extra life

Moisture, acids, alkalis and other contaminants are locked out once and for all with Super Coilife epoxy encapsulation. For full motor protection, Super Coilife can be applied to random wound stators, rotors and armatures. Super Coilife's mirror-like finish will not crack or craze under severe operating conditions.

Because of its unusually low viscosity, this new solventless epoxy completely penetrates the interstices, through the slots, thoroughly coating and protecting the windings. Since 1953, when Westinghouse introduced Coilife* epoxy encapsulation, research, engineering and development have evolved this new and improved product—Super Coilife, an exclusive process.

Only Westinghouse Repair Plants can give the right "thin-wall" thickness for each type and class of winding to give maximum heat transfer away from the windings. Before you send out your next rewind call your Westinghouse representative for the complete story or write for Booklet B-7622: Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

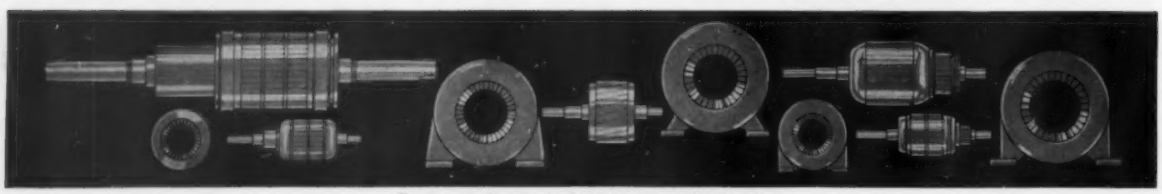
*Trade-Mark J-95197-A

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

USE WESTINGHOUSE MODERN MAINTENANCE SERVICE... SHOP REPAIRS... RENEWAL PARTS... FIELD SERVICE



For more facts circle 515 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Monorail, Crane Equipment—Presented in this 52-pp catalog is detailed information on planning and selecting an overhead material handling system. Describes tracks, trolleys, switches, cranes and electrification, and includes illustrated case histories of typical installations in various industries. The Louden Machinery Co.

102 Overhead Handling—How one company speeds materials handling and increases plant capacity is pictorially described in Bulletin M-33. Advantages of the overhead handling system are detailed and illustrated with pictures of its use in strategic areas in the plant. Whiting Corp.

103 Electric Hoists—Catalog H-59 is a 53-pp selection guide for heavy duty electric hoists ranging from ¼ to 12-ton capacity. Factors covered include capacity of hoist, speed and height of lift, dimensions of beam, type of hoist suspension, controls, current supply and operating conditions. Also contains dimensional drawings and detailed specifications. American Engineering Co.

104 Air Hoist—Bulletin ADH-79 describes an air hoist with rotary vane-type air motor for maximum power. Specifications are listed and a sectionalized drawing showing component features is included. Coffing Hoist Div., Duff-Norton Co.

105 Battery-Powered Trucks—Construction and operating characteristics of the battery powered industrial truck are presented in this 18-pp bulletin. Photos illustrating typical applications are included along with reports from typical users. Electrical Industrial Truck and Allied Products Manufacturers.

106 End-Control Truck—Featured in this 8-pp bulletin is a stand-up, end-control truck for handling materials in congested areas. Applications are illustrated, advantages described, and specifications data and performance data tabulated. Automatic Transportation Co.

107 Pneumatic Conveying System—The role of pneumatic conveying equipment in the pulp and paper industry is discussed in 16-pp Bulletin FF-26-2. Illustrated with photos and line drawings, it describes typical applications and includes specifications tables on individual components. Fuller Co.

108 Flow Rack—Illustrated and described in this fold-out brochure is a flow rack system designed to provide controlled flow of accumulated materials. Applications of the "live storage" rack are illustrated and advantages detailed. The Rapids-Standard Co., Inc.

109 Handling Containers—This 6-pp bulletin contains six case histories showing how company's receptacles improve material handling efficiency and reduce product damage in leading industries. Various types of containers are shown and advantages described. National Vulcanized Fibre Co.

110 For Materials Handling—Featured in 68-pp Condensed Catalog 596 is a line of materials handling equipment, parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers and portable power tools. Presents descriptions, data and specification on all products, and includes photos showing equipment in operation. Syntron Co.

111 Wire Rope Requirements—General wire rope recommendations for equipment most commonly used by a wide variety of industries are listed in Service Bulletin 107. Gives constructions most suitable for specific types of equipment and jobs. Leschen Wire Rope Div., H. K. Porter Co., Inc.

112 Wire Rope and Slings—Seven products in this company's wire rope and sling division are presented in five recently published bulletins. Each describes applications and provides specifications and selection data. Products covered include plastic-core and spring-core types, cable laid slings, fittings, super strength wire rope, also manila rope. Jones & Laughlin Steel Corp.

PUMPS, COMPRESSORS

113 For Large Volume Pumping—Propeller and mixed flow pumps for large volume water pumping are described in Bulletin 350. Includes cutaway drawings, installation sketches and measurements, delivery and performance data. Layne & Bowler, Inc.

114 Heavy Duty Pumps—Triplex pumps designed to withstand high pressures, high temperatures and continuous duty are described in 12-pp Bulletin 259. These are plunger type pumps for pressures to 20,000 psi and displacements to 58 gpm. Features of the pumps are illustrated and some installations pictured. Kobe Inc.

115 Internal Gear Pumps—Featured in this illustrated bulletin are internal gear rotary pumps for continuous operation in transferring medium to high viscosity liquids. Construction and performance data, as well as dimensional data and diagrams included. The Wayne Pump Co.

116 Air Compressors—Performance advantages of company's heavy duty V-vertical air compressor featuring minimum maintenance and compactness are detailed in 24-pp Bulletin A-62. The V-vertical construction details are shown on cutaway and components described, as well as force feed lubrication and mounting types. Specifications and dimensions included. Joy Mfg. Co.

117 Packaged Field Compressor—Six-pp Bulletin 171 describes a packaged field compressor for single or two-stage applications where greater horsepower is required in a two cylinder machine. Dimensional data and complete specifications are included. Clark Bros. Co.

FILTERING

118 Filter Media Selection—Twelve-pp Bulletin PUR-66D contains a chart designed to guide selection of proper engineering materials and filter media for given types of corrosive conditions. The chart lists filter media for varying concentrations of more than 125 corrosive agents. Purolator Products, Inc.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 279 and 280.

119 Automatic Filter—Bulletin B 1400-2B contains 8-pp of information on features, operation and performance of an automatic renewable media air filter. Capacity tables and dimensional plan are included Farr Co.

AIR CONDITIONING

120 Air Conditioners—Eight-pp Bulletin 9127 describes a low pressure inductor air conditioner for perimeter air conditioning of multi-room buildings. Construction and operating features are detailed, and tabular data such as heating coil capacities, gravity heating capacity, hot water and steam heating capacity factors, and water friction included. Industrial Div., American Standard.

121 Conditioner Units—Design features of Climate Makers, based on the building block principle, are detailed in 60-pp Catalog AHV-59. Blower and frame sections and other components are described. Engineering information provided includes fan capacities, direct expansion cooling capacities, and coil data, chilled water cooling capacities, chilled water coil data, mean effective temperature, psychometric data, steam and hot water heating capacities, friction tables. Airfan Engineering Co.

122 Packaged Conditioners—Eight-pp Bulletin 8525 on packaged air conditioners illustrates their design and construction features. Capacities and physical data are tabulated for both air-cooled and water-cooled units. Industrial Div., American-Standard.

123 Packaged System—Featured in 8-pp Catalog 570 is a complete air conditioning system in one compact

BULLETINS

(Begins on page 25)

unit, with all controls and maintenance points on one side of unit, so it can be installed close to a wall. Construction details, dimensions, cooling capacities, and other data included. Acme Industries, Inc.

124 Air Cleaning for Mills—Sixteen-pp Bulletin 234-PI describes three major areas where need for air cleaning is most acute—at blast furnace, at rolling mill, and wherever comfort air conditioning is prescribed. Also considers filter locations, recommended sizes and types of air filters for particular application, dust problems, maintenance and ventilation, and includes photos, schematic drawings and graphs. American Air Filter Co., Inc.

125 Air Dehumifidier—Bulletin 140 describes an apparatus using a liquid absorbent for drying air to control its properties for industrial processing and product drying at low temperatures and the air conditioning of spaces for packaging and storage of moisture sensitive materials. Operating and control details illustrated on diagram. The Niagara Blower Co.

HEATING

126 For Radiant Heating—Eight-pp "Radiant Heating Slab Construction" is an illustrated report on accepted installation procedures for radiant heating systems. Arranged in order of preference are sketches of various types of construction. Each shows position of wrought iron pipe coils in the concrete slab, as well as relationship of coils and slab to structural features of on grade and above grade construction. A. M. Byers Co.

Reader Service Cards for ordering bulletins are on pages 279-280. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

127 Heat Transfer Equipment—Described in condensed Bulletin 593 are heat exchangers, fired indirect heaters, tank heaters, tank suction and line heaters, process heaters and coolers, packaged boilers, and custom built equipment. Includes descriptive and engineering data on various types of equipment. Brown Fintube Co.

128 Make-up Air Solutions—Bulletin EN-5911 explains how make-up air properly introduced and tempered overcomes negative air pressure and eliminates problems arising when fans draw fumes, smoke or odors. Outlines design of a make-up air system and tells how to select correct equipment. Also includes schematic diagram and instructions for wiring control arrangement. Reznor Mfg. Co.

STEAM GENERATION

129 Heat Transfer Cements—Properties and uses of heat transfer cements for external heating and cooling applications are detailed in Engineering Data Book 502. In addition to general information on properties and advantages of the cements, it includes engineering data and calculations, estimating and installation data. Thermon Mfg. Co.

130 Unit Steam Generator—Bulletin 3000 describes features and advantages of a fully automatic unit steam generator for light oil, heavy oil, gas, and combination gas-oil applications. Tables of steel specifications of pressure vessel, engineering and dimensional data are included. Preferred Utilities Mfg. Corp.

131 Packaged Boilers—A complete discussion of firetube boilers—from construction features to final test and start-up service—is presented in 12-pp Bulletin Form AD 178. Full-color cutaway drawings illustrate features and design of packaged boilers through 600 hp for heating and processing, steam or hot water. Cleaver-Brooks Co.

VALVES AND FITTINGS

133 Bronze and Iron Valves—Illustrated and described in this product bulletin is a line of bronze and iron body gate, globe and check valves for heating, piping and air conditioning systems. Provides information on application, basic design features, and standard sizes. The Fairbanks Co.

134 Air Check Valve—Bulletin 125-14 gives descriptive data and specifications on air check valves offering positive seating, vertical or horizontal installation, and non-slam and non-chattering characteristics. Explains design features which contribute to valves' improved performance. Combination Pump Valve Co.

135 Flow Control Valves—Catalog 310, 8-pp, describes operating principles, design features and performance characteristics of company's mechanical feedback servo valves. Provides a schematic diagram, cutaway photo and performance curves. Also includes glossary of servo valve terminology. Moog Servocontrols, Inc.

136 Hydraulic Valves, Accessories—Twelve-pp Catalog 3000 covers filters, check valves, unloading valves, relief valves and fuses for hydraulic power systems. The filters are rated for hydraulic pressures to 5000 psi, valves up to 3000 psi. Information provided includes dimensions and pressure drop charts. Waterman Engineering Co.

137 Control Valves—Characteristics and features of company's control valve are fully detailed in 20-pp Bulletin 150. The eccentric principle utilized in this valve is diagrammed and primary advantages are listed. DeZurik Corp.

138 Safety Valve—Bulletin F-47 describes a safety shut-off valve designed for service station use, but applicable with hazardous liquid lines of all types. It is designed to shut off automatically if a break in the pipe line occurs. Bulletin covers features of the valve, applications, engineering data and economical operation. OPW-Jordan.

139 For Nuclear Industries—Complete data on valves for a wide variety of nuclear and chemical applications is presented in 190-pp Bulletin A-155. Includes information, diagrams, and charts on current line of valves, as well as engineering charts, corrosion resistance tables of 15 metals and over 400 corrosive media in various conditions, conversion tables, valve flow capacity charts. Associated Valve Co.

140 Rotating Unions—Described in this 20-pp bulletin is a line of rotating unions for water, steam, air, hydraulic, vacuum and coolant service. Complete with engineering drawings and charts, it gives installation information for all sizes and uses, and lubrication instructions. Deublin Co.

141 Seamless Fittings—Twelve-pp Bulletin FB-78 is a guide to material selection of carbon, alloy and stainless steel welding fittings and flanges. Covers specifications and analyses, effects of alloying elements, mechanical properties and arc welding procedures. The Babcock & Wilcox Co.

CORROSION PROTECTION

142 Coating Systems in Use—Applications of protective coating systems are detailed in three case history folders. Applications described include lining system for riveted tank cars; stainless steel metallizing of semi-chemical pulp digesters; and rehabilitation of rubber lined continuous pickling system. Protective Coatings Div., Metalweld, Inc.

143 Coal Tar Epoxies—This bulletin contains a compilation of laboratory tests showing what to expect when coal tar epoxies are exposed to attack of various corrosive solutions and environments. Tests include salts, acids, caustics, bleach, petroleum products, distilled water and weathering. Amercoat Corp.

CONSTRUCTION

144 For Concrete Construction—Comprehensive information on products for concrete and masonry construction is presented in this manual. Individual sections of it cover characteristics and applications of various types of concrete surface treatments and concrete admixtures, waterproofing and dampproofing treatments. Includes complete details on how to use products. Tretol Inc.

(More Bulletins on page 281)

LONG LIFE WITH NO LUBRICATION...

The Joy T-block design compression rings are an exclusive Joy feature with patents pending.

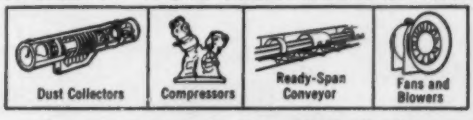
exclusive T-BLOCK design doubles life of piston rings on JOY oil-free compressors

All Joy oil-free compressors are equipped with carbon-graphite piston rings of T-block design. They require no lubrication and compensate automatically for wear. Blow-by is virtually eliminated for the life of the ring. Brass expanders and stainless steel springs operating in teflon sleeves provide the piston rings with controlled pressure evenly distributed on the cylinder walls. Result: "bug-free" operation and freedom from corrosion. Compressor owners report ring life of 8000 operating hours, and more.

If your operations require oil-free compressed air, whether for instrumentation or for processing, get complete details from Joy. A complete line of oil-free compressors is available from 95 to 3600 cfm, 15 to 600 hp.

Ask for free bulletin 301-15.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



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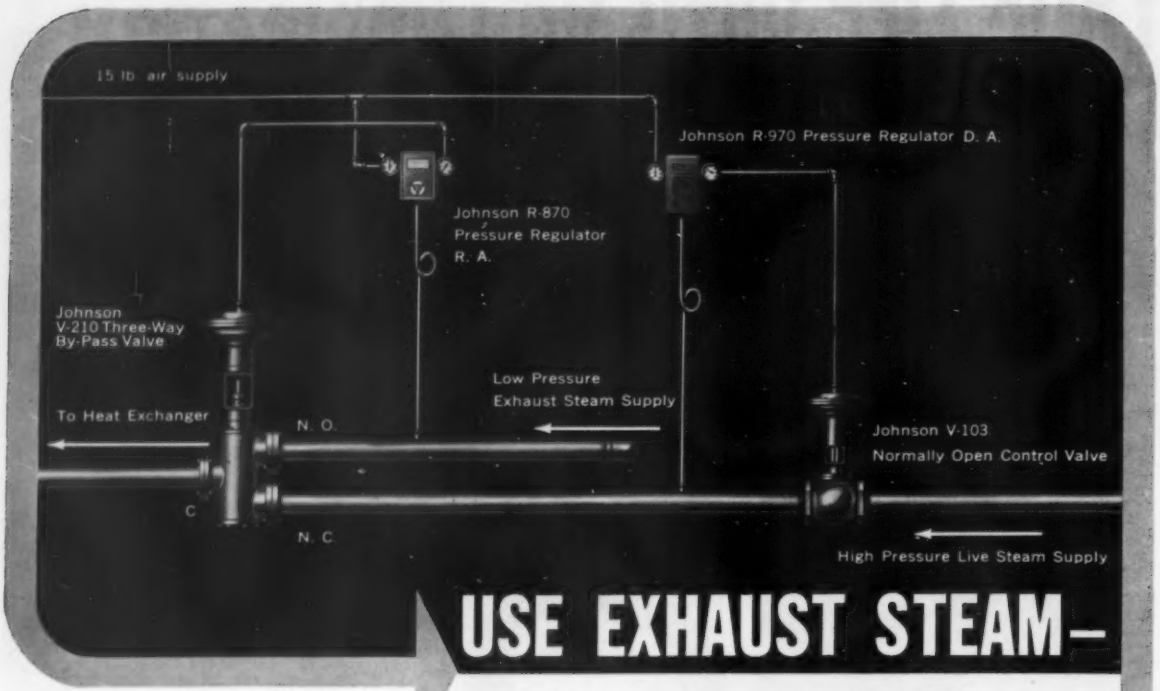

USE EXHAUST STEAM— CUT YOUR COSTS

Johnson Control Hook-up Switches to Live Steam Only When Necessary

This simple control installation saves substantially on the consumption of live steam. And the savings are automatic!

Operation of the hook-up is positive and dependable. As exhaust steam pressure builds up to usable level, the Johnson Pressure Regulator activates the Three-Way Valve. The valve then shuts off the live steam and admits exhaust steam to the line. When exhaust pressure drops, the process is reversed.

Heart of the hook-up is the Johnson Three-Way By-Pass Valve. The 100% tight-closing design of this valve enables it to do the work of *two* ordinary valves. It can be piped straightaway for easier, less costly installation. Discs and seat rings can also be replaced with the valve in the line . . . for still further savings in maintenance.

Here is a method which can produce large economies for you by utilizing exhaust steam. Its effectiveness has been proved in scores of installations. For further information about the controls used, mail the coupon below.

JOHNSON SERVICE COMPANY
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Please send me your apparatus bulletins describing the following equipment: ☐ R-870 Pressure Regulator ☐ R-970 Pressure Regulator ☐ V-210 Three-Way By-Pass Valve ☐ V-103 Normally Open Steam Control Valve ☐ New Condensed Catalog of All Johnson Equipment ☐ Have a Johnson engineer call.

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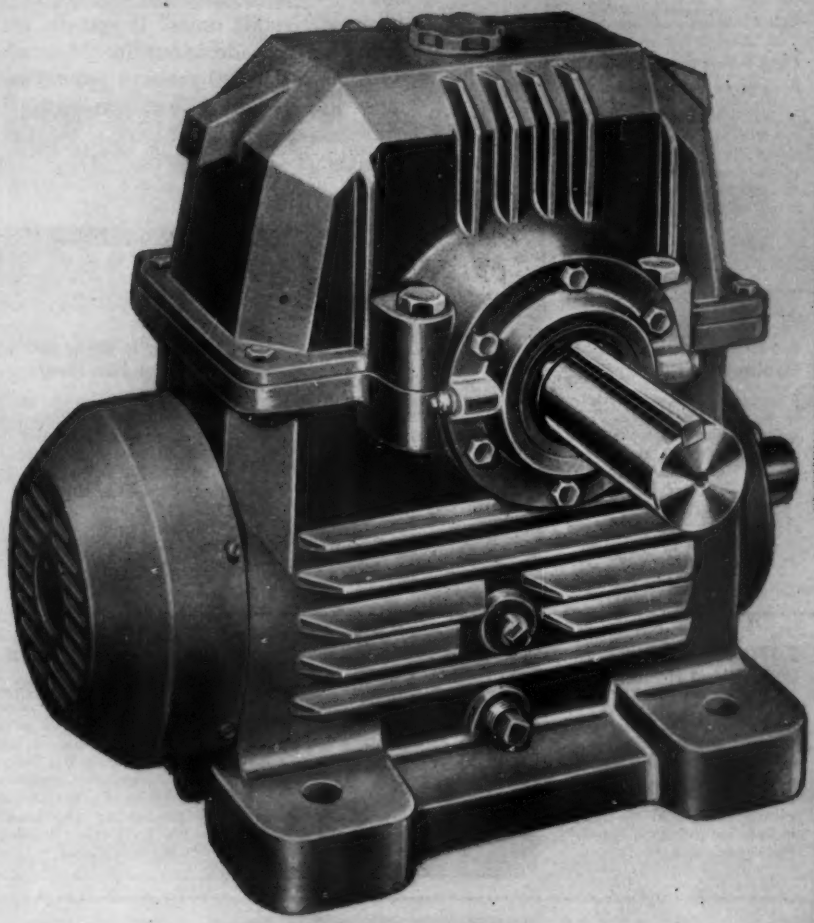
SPEED REDUCERS

De Laval Announces All New Line of Single Reduction Speed Reducers



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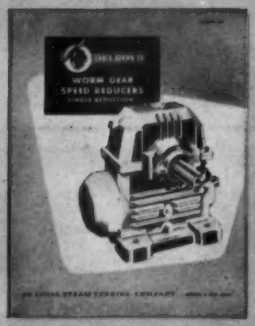

New Delroyd single reduction speed reducers are available in a wide range of sizes and horsepower ratings. These worm gear units include centrifugally cast gears and fan cooling, and carry *the new AGMA ratings.*

DE LAVAL *Steam Turbine Company*
911 NOTTINGHAM WAY, TRENTON 2, N. J.

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Speaking of FLEXIBILITY...

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Can you think of a need that calls for a unit heater — steam, hot water, gas, or electric — which can not be met by one of these Nesbitt units? If you do, let us know; we may add to our line. Meanwhile, with more than 40 years of proved excellence in ***this*** *line, why not make Nesbitt your name to go buy?*

STEAM & HOT WATER

1,084 ways to employ Nesbitt Propeller Fan Heaters

Eight basic sizes, 24 models; universal heating elements for steam or hot water; capacities, 15,200 to 335,000 Btu/hr; sound code rated—*Publication 401.*

6,510 ways to employ Nesbitt Cabinet Unit Heaters

Series A: versatile high-capacity units; seven basic sizes (265 to 1860 cfm) for steam (71 to 545 sq. ft. edr) or hot water (9.1 to 120 mbh); recessed, semi-recessed, or non-recessed models; floor, wall, ceiling and inverted mountings—*Publication 403.*

5,170 ways to employ Nesbitt Little Giant Heaters

Draw-through propeller fan units with universal heating elements for steam or hot water; 14 sizes, 34 models; 16,000 to 610,000 Btu/hr; wide choice of vertical or horizontal discharge outlets; sound code rated—*Publication 402.*

22,800 ways to employ Nesbitt Giant Unit Heaters

For large capacity heating and/or ventilating, free or static delivery; 12 basic sizes each with choice of 10 heating elements; steam or hot water; 83,000 to 1,735,000 Btu/hr; one to three fans; four mountings—*Publication 404.*

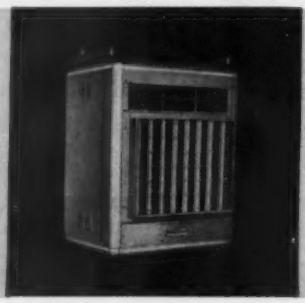
GAS-FIRED UNITS

200 ways to employ Nesbitt Propeller Fan Heaters

Lightweight and more compact, the new Series K gas-fired unit heater is versatile and attractive. 25,000 to 250,000 Btu/hr input. Sound code rated—*Publication 400.*

240 ways to employ Nesbitt Blower Fan Heaters

For extreme quietness, free delivery or use with ducts. Eight basic sizes, 50,000 to 250,000 Btu/hr input; universally approved for all types of gas; standard horizontal or (optional) double deflection louvers —*Publication 400-2.*



30 ways to employ Nesbitt Gas-fired Duct Furnaces

Efficient, automatic gas heating for use with air-conditioning units or with custom ductwork in heating and processing. Six basic sizes, 80,000 to 250,000 Btu/hr input; aluminized steel or stainless steel heat exchanger—*Publication 400-3.*

that there are 38,852 ways to employ the Nesbitt complete line of UNIT HEATERS

Fantastic? Not at all! Considering all the basic sizes, installation arrangements, types and capacities of heating elements, fan speeds, and discharge outlets, there are actually 38,852 catalogued situations in which at least one of the broad line of Nesbitt Unit Heaters will meet the demands with complete satisfaction. What more could you ask?

Made by* John J. Nesbitt, Inc., Philadelphia 36, Pa.—Basic Ingredient: *Excellence

ELECTRIC UNITS

Also available in electric: Nesbitt Syncretizer and Thermovent heating and ventilating units; Nesbitt Wind-o-line and Sill-line radiation.

28 ways to employ Nesbitt Propeller Fan Heaters

Fast and efficient heat, automatic or manual control; in four basic sizes, 14 models; capacities from 5,118 to 122,832 Btu; replaceable black-heat elements; totally enclosed motors; quiet Q-type fans—*Publication E401.*

2,790 ways to employ Nesbitt Electric Cabinet Heaters

Three basic sizes, 10 models; 3.3 to 30 kw, 11.4 to 102.4 mbh; recessed, semi- and non-recessed models; floor, ceiling, wall, or inverted mounting; manual or automatic control; two or more fans; sound code rated—*Publication E403.*

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Chemical & Power Products offers a complete Filled-Teflon Bearing service, including Chempro Finished Bearings either Pressed in Housings or without Housings, or Chempro Filled-Teflon Molded Tubes for machining bearings in your shop. Complete machining instructions furnished.

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FM-2	Glass-Filled Teflon
FM-3	Carbon-Filled Teflon
FM-4	Glass and Carbon-Filled Teflon
FM-8	Graphite- and Zircon-Filled Teflon
FM-9	Molybdenum Disulfide and Glass-Filled Teflon
FM-10	Mica- and Glass-Filled Teflon

Write for Bulletin CP-558.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N.Y.

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BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

For Industrial Health Course

PLANT ENGINEERING:

"Once again the time for our annual fall courses for industrial hygiene engineers and chemists is approaching. Last year you were most gracious in sending us copies of an article by Mr. K. E. Robinson—'Industrial Ventilation.' If a dozen copies of the article are still available, may we receive them for distribution to our students." *Howard L. Kusnetz, Sanitarian, Engineering Services, Department of Health, Education and Welfare, Public Health Service, Cincinnati, Ohio.*

▸ We still have a few of these reprints on hand at 25 cents each.—*Editors.*

Elevating Platform Demonstration

PLANT ENGINEERING:

"Several years ago, while attending the Plant Engineering Maintenance Show in Cleveland, I saw some elevating platforms that could be used in a maintenance department for changing lamps, etc.

"We have an application for a one man lifting platform. It would be permanently fixed in position and would lift from a 3-ft level to about a 7-ft level.

"If you should recall this demonstration, please advise the name of the manufacturer." *Alfred Gielbunt, Maintenance Manager, John W. Bolton & Sons, Inc., Lawrence, Mass.*

▸ We do not recall the particular demonstration alluded to by our correspondent, but we have sent him a list of manufacturers of this type of equipment. We are sure one of them will be able to supply his needs. —*Editors.*

How To Avoid Electric Shock

PLANT ENGINEERING:

"Copies of the article 'When Is Electric Shock Fatal?' from your April, 1959 issue, which you recently sent us at our request, were passed to the Safety Director of our company, to the Production Manager of our Division and, here at our plant, to the Maintenance Foreman who used it as a basis for a safety meeting, then distributed copies to our maintenance mechanics. It has been very effective. The drawings are particularly good in illustrating the text.

"Many thanks and best wishes for continuation of the high quality articles which you have been publishing." *H. L. Cromwell, Plant Manager, Stauffer Chemical Co., Freeport, Tex.*

Removing Milkstone From Stainless

PLANT ENGINEERING:

"The article entitled 'Keep That Stainless Clean!' appearing in the June, 1959 issue of PLANT ENGINEERING contains what we feel to be at least an error in classification in the chart listing cleaning agents for stainless steel under Group 4. The recommendation of a 5 to 15 per cent caustic soda solution to remove milkstone from stainless steel does not conform to current practice in the industry.

"Milkstone, which consists largely of the mineral deposits of the milk itself, is extremely resistant to removal by all the reagents of alkaline nature. Virtually all effective milkstone removers on the market today are based upon either phosphoric acid, hydroxyacetic acid (glycolic acid), or a combination of both." *R. K. Shogren, Plant Engineer, Klenzade Products, Inc., Beloit, Wis.*

Waterproofing Concrete

PLANT ENGINEERING:

"I would appreciate your sending me any information you have on waterproofing concrete and masonry surfaces." *P. J. Clancy, Peter Baran & Sons, Inc., 402 First St., Harrison, New Jersey.*

▸ Several articles and papers on this subject have been sent to Mr. Clancy with the compliments of the editorial department—*Editors.*

Parking Lot Information

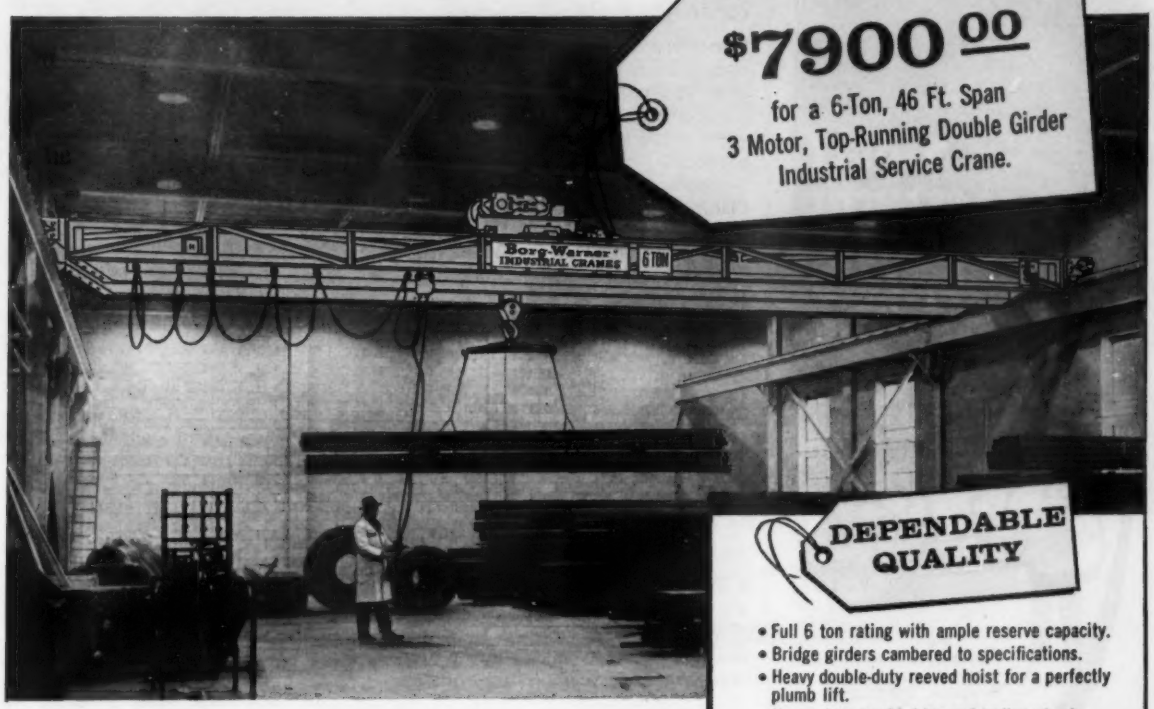
PLANT ENGINEERING:

"We wish to obtain one reprint of each of the following articles which appeared in PLANT ENGINEERING, pages 98-99, June, 1958: 'Parking Lots Are Problems, Problems With People' by Burke W. Wombacher.

"We would like to purchase either a reprint of this article or the back issue. If you can advise us of additional information on planning industrial parking areas it would be greatly appreciated.

"We have read with interest another article by Mr. Wombacher which appeared in the January, 1959

Now you can afford Borg-Warner Quality in your next overhead Crane...



DEPENDABLE QUALITY

- Full 6 ton rating with ample reserve capacity.
- Bridge girders cambered to specifications.
- Heavy double-duty reeved hoist for a perfectly plumb lift.
- Heavy duty steel bridge and trolley wheels.
- All welded jig bored, jig assembled end trucks.
- Long life precision ball and roller bearings throughout.
- Precision assembly of girders and end trucks with fitted bolts in reamed holes.
- Outrigger machinery girder construction.
- Magnetic bridge brake.
- Heavy duty gear reduction bridge drive.
- Fluid coupled bridge and trolley drives.
- Full magnetic push-button floor control.

ADVANCED DESIGN

The crane illustrated is a typical double girder installation. Span may be shorter or longer with greater or smaller capacity and for lighter or heavier duty, intermittent or continuous. Whatever your overhead handling requirements Borg-Warner Industrial Cranes can supply your needs with quality equipment at a price you can afford!

Advanced engineering and standardization make...

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BETTER VALUES at LESS COST

Borg-Warner crane engineers and production men have taken a new look at the entire line and come up with important economies through extensive use of standardized interchangeable components. Because these savings are passed along to you, you get more crane for your money when you specify Borg-Warner Industrial!

Efficient overhead materials handling pays off. You get more overhead storage space than fork truck handling provides. You benefit from aisles and work areas uncluttered by floor-type handling equipment. You can reach all areas under the crane, the full length of the runway.

If you are planning a new factory building, an addition to present facilities or a modernization program, it will pay you to look to Borg-Warner Industrial Cranes for the best values in overhead materials handling equipment.

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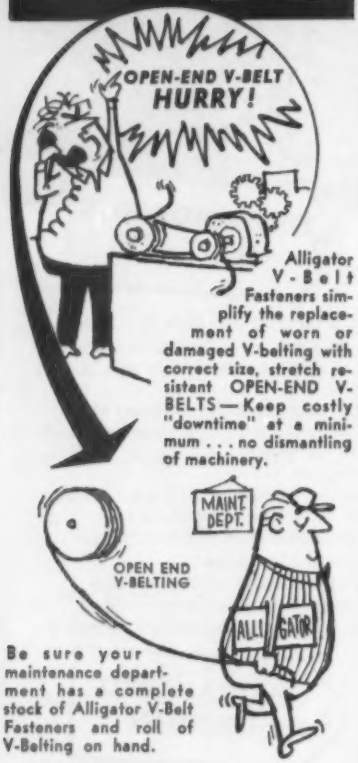
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HURRY!
Alligator V-Belt Fasteners simplify the replacement of worn or damaged V-belting with correct size, stretch resistant OPEN-END V-BELTS — Keep costly "downtime" at a minimum . . . no dismantling of machinery.
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Be sure your maintenance department has a complete stock of Alligator V-Belt Fasteners and roll of V-Belting on hand.

FOUR TYPES . . .

- **Regular V-Belt Fasteners for B, C, D, E, & BB V-Belting**
- **Aluminum (ideal for high speed belts, as used in cotton gin industry)**
- **Monel**
- **Permanently Assembled.**

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BACKTALK— FORETHOUGHTS

issue of PLANT ENGINEERING." *Florence Fosgate, Librarian, Trans-Sonics, Inc., Burlington, Mass.*

▸ In the past we have published several articles on parking lots and a copy of those which are still in print have been forwarded to our reader with compliments of the editorial department.

Further information is given in "How To Lay Out a Parking Lot." This book is available at the price of $1.00 from Western Industries, Inc., 2742 West 36th Place, Chicago 32, Ill.—*Editors.*

Guarding Exit Doors

PLANT ENGINEERING:

"Please send all the detailed information available regarding 'How To Guard Exit Doors Electrically,' which was published on page 113 of your June, 1959 issue. Thank you." *C. E. Dahl, Plant Engineer, Librascope Inc., Glendale, Calif.*

▸ This request has been forwarded to the author of the article, Walter Jacoby, who will be glad to answer readers' questions about this protection system for exit doors.—*Editors.*

Pneumatic Instruments

PLANT ENGINEERING:

"We would like to request your permission to reprint portions of your article, 'How To Get Top Performance from Pneumatic Instruments,' which appeared in the June, 1959 issue of PLANT ENGINEERING. This would be for the use of our field sales force only.

"Better still, could reprints of this article be obtained from you direct?" *R. J. Peters, Jordan Corp., Cincinnati, Ohio.*

▸ Permission to reprint this article as it stands is gladly given.—*Editors.*

Sprayed Metal

PLANT ENGINEERING:

"Would you please let me know where I can get detailed information on the equipment and the process described on page 108, PLANT ENGINEERING, June, 1959. The article is entitled 'Metal Spray Plus Heat—Tough Surface Coating.'" *O. R. Fletcher, Machine Shop Superintendent, Reynolds Metals Company, Bauxite, Ark.*

PLANT ENGINEERING:

"Please send me more information about 'Metal Spray Plus Heat—Tough Surface Coating,' found on page 108 of June, 1959 issue of PLANT ENGINEERING." *George A. Frew, Asst. Maintenance Supt., Spencer Chemical Co., Pittsburg, Kan.*

▸ We have passed along these requests to the Wall Colmonoy Corp. of Detroit, Mich., who will be glad to answer any questions about the Sprayweld process. The process gives a fusion-bonded, non-porous metal surface that can be machined.—*Editors.*

Providing Dust-Free Areas

PLANT ENGINEERING:

"In the July, 1959 issue under the column 'Backtalk and Forethoughts' was an item referring to supplying of information concerning manufacture of nylon tents to provide dust-free work areas.

"Would you be so kind as to provide the names and addresses of the several suppliers of such tents." *Fred D. Wendt, General Foreman—Assembly, Joy Manufacturing Co., Michigan City, Ind.*

▸ Names of manufacturers of this type of equipment are available to interested readers.—*Editors.*

Recruits to Plant Engineering?

PLANT ENGINEERING:

"In your June issue, a reader requested reprints on articles you had on the plant engineering profession, for use by a young engineering student. I would also appreciate such reprints and any bibliography you may have on the subject." *J. F. McGovern, Project Manager, Plant Engineering Design, International Business Machines Corporation, Kingston, New York.*

PLANT ENGINEERING:

"I am seeking detailed information of duties of plant engineers. It seems to me that PLANT ENGINEERING published some information on this subject some time ago. I realize that these duties differ widely among plants. However, if you have any information available on this subject or can direct me to some good source, I would be most appreciative." *H. E. Gorney, Chief Plants Engineer, The Standard Register Co., Dayton, Ohio.*

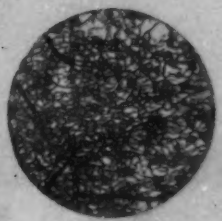
▸ We do not know of any bibliography on the subject of plant engineering as a profession, but we have forwarded to these readers reprints from earlier issues of PLANT ENGINEERING which we hope will give a comprehensive—and attractive—view of the profession to all would-be plant engineers.—*Editors.*

Look for the label that assures WEATHER-RESISTANCE

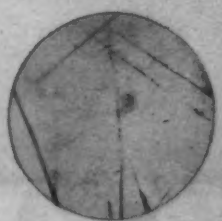
When you see this label on a glass-fiber reinforced panel, you can stop worrying about how the panel will look after years of outdoor exposure. The label certifies that the panel is made with PARAPLEX P-444 acrylic-polyester resin, and means that the panel will show practically no discoloration or fiber evidence even after years of exterior use. The photomicrographs below show the difference, after 36 months, between test panels made with PARAPLEX P-444 and those made with conventional light-stabilized polyester resin.

Only panels made with PARAPLEX P-444, the Rohm & Haas acrylic-polyester resin, can bear this identification label. We will be glad to send you the names of manufacturers who use PARAPLEX P-444.

36-MONTH FLORIDA EXPOSURE TEST



Conventional light-stabilized resin



PARAPLEX P-444

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

PARAPLEX is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.

PARAPLEX P-444

For more facts circle 523 on Reply Card

ROLLING STEEL DOORS

Manually, Mechanically, or Electrically Operated

Here is another Rolling Steel Door application in which operating space, protection against intrusion, and fire safety were prime factors in the selection of doors for an all-metal building which houses large units of road building and road maintenance equipment.

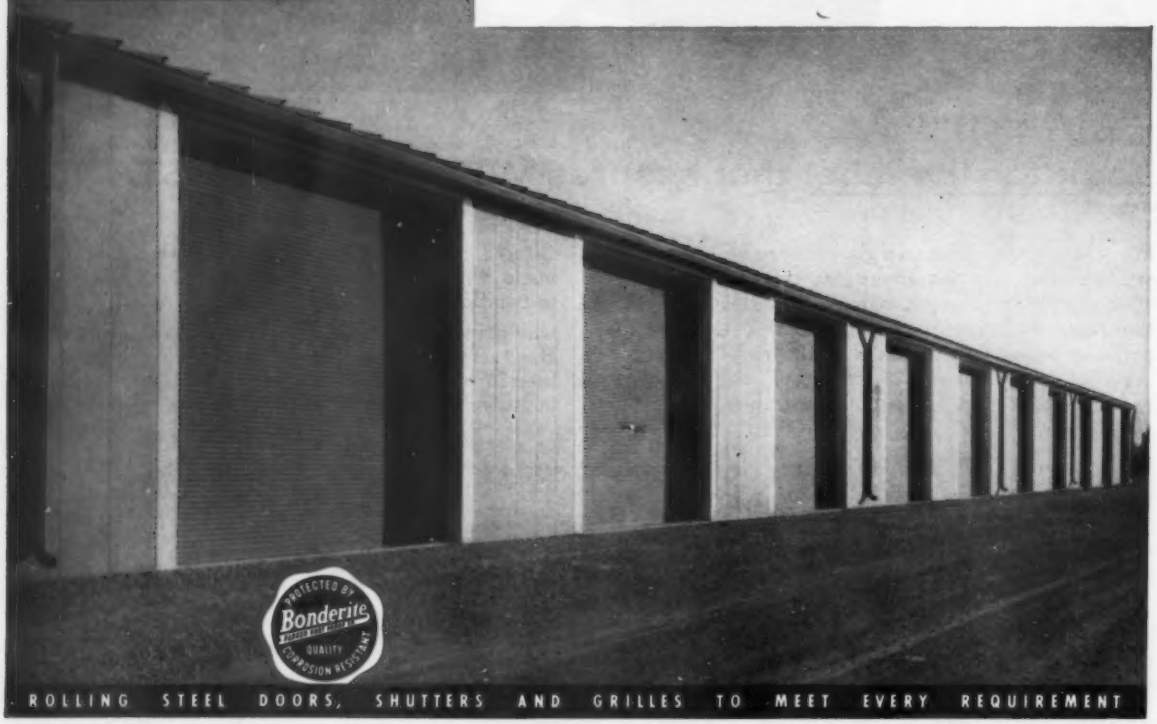
The vertical roll-up action of Mahon Rolling Steel Doors requires no usable space either inside or outside the opening—and it eliminates overhead tracks which restrict headroom and interfere with crane handling. Their all-metal construction gives you the permanence of Bonderite-protected galvanized steel . . . maintenance is minimal; and, in steel, you get maximum protection against intrusion and fire.

No other type of door provides all of these important features which are so essential for functional efficiency in busy doorways today. When you are ready to buy a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, including Specifications, or write for Mahon Catalogue G-59.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco
Sales Representatives in All Other Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Illustrated above are Ten 12 Ft. x 13 Ft. Mahon Rolling Steel Doors installed in a new, all-metal building constructed at Wayne, Michigan, by the Wayne County Road Commission to house large units of road building and road maintenance equipment.

MAHON

For more facts circle 524 on Reply Card

For more facts circle 525 on Reply Card——→

Photo Courtesy Eastern Stainless Steel Corp., Baltimore, Md.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN STEEL MILLS: This rugged 100-ton giant proves that P&H builds a true steel-mill crane which is *specifically designed* for steel mill use.

P&H steel-mill cranes are bigger and heavier. Their design combines brute strength and special metallurgy for lasting vertical and lateral stability. Each unit is engineered to easily handle constant massive loads — to shrug off strains and stresses of frequent shock loads — and to resist the terrific blasts of heat without effect on crane parts and structural supports. No disrupting your production when you use P&H!

Equally important to you — P&H is the *only* crane manufacturer that makes the *entire* crane . . . including all structural, mechanical, and electrical parts . . . and then gives you guaranteed one source responsibility. *Remember that* . . . the next time you buy a crane on which your mill production will depend! For more information, write for Bulletin C-42, Dept. 107, Harnischfeger Corp., Milwaukee 46, Wisconsin.

P&H

HARNISCHFEGER

...quality and service for 75 years

OUR 75TH YEAR

TOMORROW'S NEWS GETS A "LIFT" FROM P&H

The newspaper must go out on time! And to start heavy rolls of newsprint into production, this major metropolitan daily relies on the finest hoists in the world to keep things moving . . . new Balanced-Design P&H Hevi-Lifts.

Balanced Design means that each part of the new P&H Hevi-Lift hoist has been balanced or matched with every other part for maximum strength, temperature, and performance characteristics. *There are no weak parts!*

Even under severe duty cycles — motor, gearing and brakes continue to function at top efficiency without excess heating or abnormal wear. In short, *Balanced-Design Hevi-Lifts will stand up longer under heavier duty cycles — with less maintenance — than any other hoist made today!*

If you can't afford "second chances" in your materials handling, write today for Bulletin H-55 and take a long look at the complete line of Balanced-Design P&H Hevi-Lifts. It's yours for the asking from Dept. 206, Harnischfeger Corp., Milwaukee 46, Wisconsin.

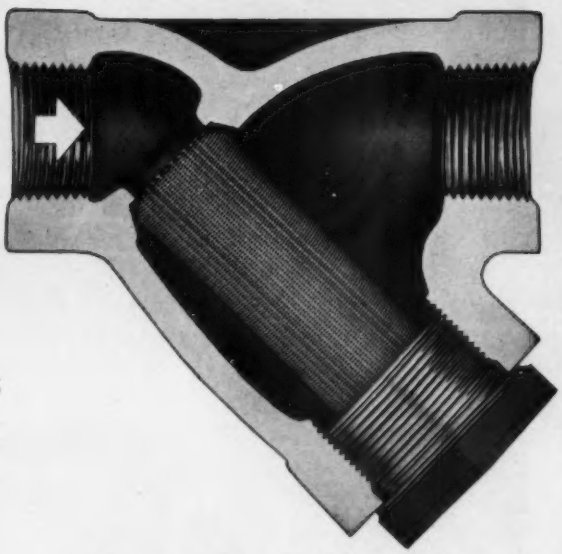
P&H **HARNISCHFEGER**
...quality and service for 75 years

OUR 75TH YEAR

Photo Courtesy New York NEWS

FROM MONEL SCREEN TO PARKERIZED BODY

THEY'RE YARWAY QUALITY



Yarway pipe line strainers are *built for service*—combine more outstanding quality features than any other strainer.

SCREENS are of fine Monel woven wire—sturdy, non-corrosive, long-lasting. Round particle retention size range: .008″ to .011″. Perforated screens also available. All screens removable and replaceable.

SCREEN CAPS have straight threads, machined faces, spark-plug-type gaskets. Screen comes out with screen cap for easy cleaning. Cap screws back tight without excessive force.

TAPERED SEAT in body, plus straight thread on cap, insure proper alignment, tight fit when screen is replaced after cleaning.

PARKERIZED BODY FINISH, *inside and out,* protects against corrosion.

BODIES on standard strainers are cast iron or steel, screwed, socket-weld or flanged connections. Bronze, stainless steel and aluminum bodies also available.

SIZES and PRESSURES—Screwed, ¼″ to 3″; pressures to 600 psi. Socket-weld, ¼″ to 3″, pressures 600 and 1500 psi. Flanged, ½″ to 5″, pressures to 600 psi.

For long life, for effective service, you can't buy a better strainer—and Yarways are cheaper in the long run.

Yarway strainers are stocked and sold by the same 270 Industrial Distributors who sell Yarway Impulse Steam Traps; one near you. Write for Bulletin S-205.

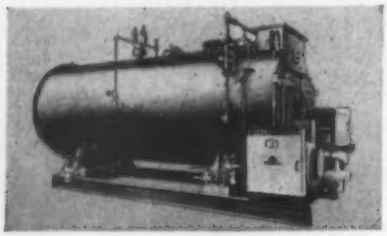
YARNALL-WARING COMPANY, 100 Mermaid Ave., Philadelphia 18, Pa.

YARWAY®

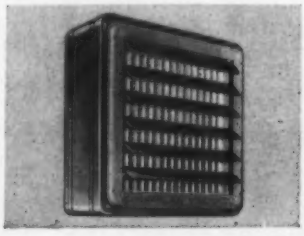
FINE SCREEN STRAINERS

For more facts circle 526 on Reply Card

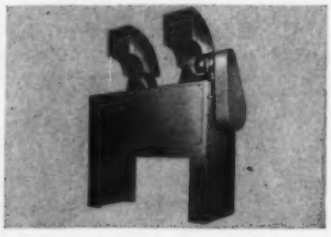
Firebox, scotch-type steel boilers and package units for heating, power, and process steam.



Vertical and horizontal unit heaters for steam or hot water; also gas-fired.



Industrial unit heaters for steam or hot water; high capacities, quiet operation.



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AIR-CONDITIONING EQUIPMENT: Refrigerating Machines • Water Chillers • Heating and Cooling Coils • Central-Station Air Conditioners Packaged Air Conditioners • Air Washers • **AIR-HANDLING EQUIPMENT:** Centrifugal, Propeller, and Axial Fans • Power Roof Ventilators Utility Sets • Specialized Fans and Blowers • **HEATING EQUIPMENT:** Firebox, Scotch-Type and Packaged Boilers • Steam, Hot-Water, and Gas-Fired Unit Heaters • Heating and Ventilating Units • Cabinet Heaters • **PROCESS EQUIPMENT:** Dust Collectors • Heat Exchangers Lube Oil and Jacket Water Coolers • *Gyrol*® Fluid Drives • Centrifugal Compressors • Mechanical Draft Fans • Surface Condensers

CALL . . .

brings all the facts about heating equipment for your plant!

You'll find it pays to talk to American-Standard* Industrial Division about heating equipment for any requirement . . . from small spot-heating jobs to complete plant systems. For, with the combined American Blower, Ross Heat Exchanger, and Kewanee Boiler product lines . . . American-Standard Industrial Division offers a broad range of components for efficient heating on any scale.

It's convenient to deal with one organization. But even more important, we offer you the advantage of one-source responsibility for quality and performance in heating equipment that is designed, engineered, and manufactured to work together.

Give us a call. There are offices in all principal cities, staffed by product specialists to assist with equipment selection and on-the-job problems. AMERICAN-STANDARD INDUSTRIAL DIVISION, DETROIT 32, MICHIGAN. IN CANADA: AMERICAN-STANDARD PRODUCTS (CANADA) LIMITED, TORONTO, ONTARIO.

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PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Transistor-Operated Circuit Breaker Provides Protection From Short Circuits

A CIRCUIT SAFETY development, which consists of an electronic generator operating on transistors, and detection devices, has been developed by the Research Center of the French Coal Industry. Prototypes of this circuit breaker used in French coal mines for more than a year have, on four occasions, protected them from serious incidents due to short circuits.

The circuit breaker creates a current of 5000 cycles per second, which is injected into the electrical system to be monitored. A detector is set to cut out the system at an intensity of 5000 c. The circuits on which motors are operated are loosely coupled to the appropriate condensers on the detection device.

The 5000 c current assumes a very feeble intensity which varies little whether the motors are stopped, are starting, or are in full operation.

Interior of circuit breaker. Sensitivity can be regulated according to any need.

When a short circuit occurs, the ohmic resistance of the network is lowered, bringing about an increase in the intensity of the 5000 c current. This increase in intensity is detected by the protective mechanism which closes off the faulty section of the system.

Sensitivity of the apparatus can be regulated according to need. In use of a three-conductor flexible cable one mile and a quarter long, it can detect a fault in resistance of 20 ohms and cut the current in 100 milliseconds; if the same setting detects a fault of 5 ohms, the current is cut within 25 milliseconds.

A complex electric system may be protected with only one generator and as many detectors of resistance faults as there are outlets for use of the current. The whole apparatus is small and may be housed in existing local electrical control boxes. The circuit breaker is made by Merlin & Gerin, Grenoble, France. *From France Actuelle, published by Comité France Actuelle, Paris, France.*

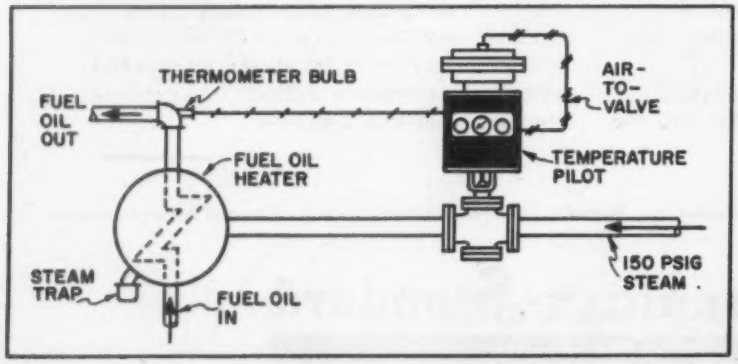
Valve-Mounted Instruments Give Local Control of Process Units at Six Field Locations

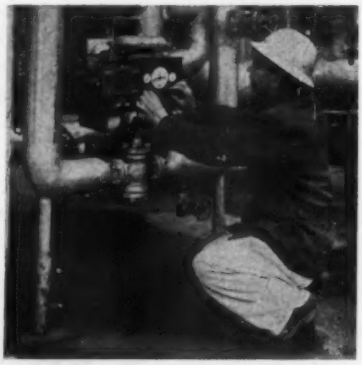
AT SIX FIELD locations in Cities Service's new asphalt refinery in Linden, N. J., valve-mounted instruments are providing local, low-cost indication of temperature or pressure together with pneumatic proportional control. Except for routine maintenance, these control systems have given continuous, trouble-free service since July 1958 when the refinery went on stream.

The instruments mount on the yokes of the pneumatically-operated diaphragm motor valves that they position to provide automatic control of a process unit. They are of a type commonly referred to as "pilot" controllers. Five have Bourdon tube elements for pressure control and one has a filled thermal system for temperature control. Both the actual value of the process variable and the control set point are indicated by pointers on the 3½-in. center dial of the controller.

Supplementing other extensive instrumentation with indications and records in a centralized control room, the instruments perform such functions as regulating steam pressures to feedwater deaerating heaters, steam pressure reduction, and

(Continued on page 44)





Pilot controller in this application is mercury filled thermometer used to control the temperature of steam-heated fuel oil.

NOW a single Condulet® for any make motor starter and circuit breaker!

*TYPE DMC: Dust-Ignition-Proof (Dust-Tight) — National Electrical Code Class II, Groups E, F and G; NEMA Type 9EFG.

**TYPE WMC: Watertight — NEMA Types 3, 3R, 4 and 5.

UNIQUE COVER HINGING ARRANGEMENT allows DMC-WMC Condulets to be mounted directly adjacent to other Condulets without providing extra space between for cover to hinge open. Cover pulls out, then to *either* side to clear adjacently-mounted Condulets or other equipment.

CROUSE-HINDS TYPES DMC* AND WMC** Combination Line Starter CONDULETS

DMC-WMC Condulets are designed to accept and operate any of the various makes of motor starters and circuit breakers. Single speed non-reversing combinations are equipped with a universal mounting plate, motor starter reset assembly and circuit breaker operating assembly. No substitutions of any parts on the Condulets are required.

Built-in push-button stations and selector switches with various contact arrangements, pilot lights and control transformers can be supplied. Push-button and selector-switch operating shaft holes and pilot-light holes may be drilled, tapped and plugged for future use.

Separate mounting lugs are bolted on body. A center position is provided on back of body so that lugs can be attached for 3 point suspension or center pole (2 point) mounting. Circuit breaker handle has provision for padlocking in "On" or "Off" position.

WRITE for descriptive literature and specifications . . .
or contact your Crouse-Hinds distributor.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

● CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) ● FLOODLIGHTING
● TRAFFIC CONTROL SYSTEMS ● AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Charlotte Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington
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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

pressure control for a fuel oil recirculating pump. The controller (range 50 F to 400 F) regulates temperature of fuel oil from heater.

Each arrangement is a closed loop system, maintaining secondary variables at desired values. In each case the measuring element connects to the Bourdon tube in the valve-mounted controller; the pneumatic signal from the controller connects to the diaphragm motor of the valve (air-to-valve line shown in the diagram) to position the valve. Controllers are equipped with wide band proportional control with automatic reset to assure close regulation of the variable in spite of load changes. *From a release of U. S. Gauge, Division of American Machine and Metals, Inc., Sellersville, Pa.*

Odorless Atmosphere for "Sniffery"

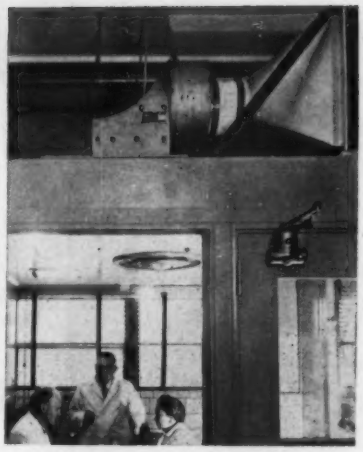
WITH FRAGRANCE its principal stock-in-trade, Shulton, Inc. goes to great lengths to provide ideal "sniffing" conditions for its staff of perfumers.

Latest innovation at the Shulton plant is a sealed-off cubicle known officially as a fragrance evaluation room, but more commonly called a "sniffery." A specially-designed ventilation system completely changes the air in the 8-ft-square room every minute and incoming air is not only "conditioned" and filtered in the usual way, but is also passed through a bed of activated carbon to completely remove all traces of odor.

Against this constant, scentless background, perfumers daily check the fragrance of finished products and raw materials from all over the world.

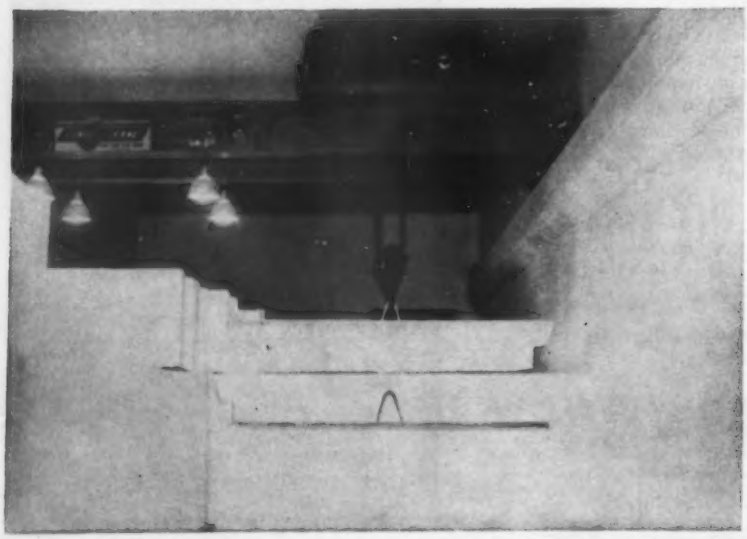
A 450 cfm blower maintains a positive pressure in the room so that no outside air can infiltrate. Air from the ventilating system enters the room through a special no-draft diffuser in the ceiling, and is exhausted through a louver in the sealed door.

The system was designed by Connor Engineering Corporation of Danbury, Conn. The bed of activated carbon through which the air passes is designed as an easily-replaced cell that contains approximately 45 pounds of activated carbon, estimated to require replacement only every 10 or 12 months. *From a release of Union Carbide Corporation, New York, N. Y.*



Activated carbon keeps room odorless so that perfumers can evaluate scents.

Crane Remotely Controlled With Help of Television



Crane removes 15-ton concrete cover from cell to be charged with material at Georgia Nuclear Laboratories. Operator, shielded from radioactivity, views crane hoist and cargo on television monitor which enables him to manipulate crane by remote control. (From a release of Conco Engineering Works, Mendota, Ill.)

Check Those Sprinklers

ALTHOUGH IN EACH plant the guard force should have specific instructions on their responsibilities in connection with sprinkler systems inspection, the following generally are the vital points of the sprinkler system which need regular attention.

1. Shut-off valves—These obviously must be kept open. Though some systems have automatic alarms to detect this, the security guard should immediately report any valve found shut.

2. Air pressure—It must be kept up to insure proper flow of water from pressure tanks and to prevent tripping of dry-pipe systems. Excessively high or low pressure should be reported immediately.

3. Steam pressure—This must be maintained constantly for engine-driven fire pumps. Gage readings below required minimums should be reported immediately.

4. Power supply—At some installations fire pumps are driven electrically. Guards should check the electricity supply regularly.

5. Water level—Where gravity tanks are the source of water, the required water level must be maintained.

6. Water temperature—Temperature in outdoor tanks must not drop to the freezing point. If an

new roof or

reroof: new 1¾" FOAMGLAS®

roof insulation for longlife efficiency at low cost

A low cost way to give your next roof a new lease on a long life. That's Pittsburgh Corning's NEW 1¾" FOAMGLAS roof insulation.

The NEW FOAMGLAS thickness brings the unique benefits of the only cellular glass insulation to the many roofs requiring less than 2" insulation. And its cost is 25% lower. This means FOAMGLAS without a vapor barrier now costs the same installed as other less effective roof insulations requiring a vapor barrier.

And NEW 1¾" FOAMGLAS brings you this unique combination of performance-proved benefits: it is dimensionally stable, can't burn—and is moisture- and vapor-proof to insure constant insulating value for the life of your building. It is strong enough for all roof and traffic loads. No other insulating material can approach this combination of benefits.

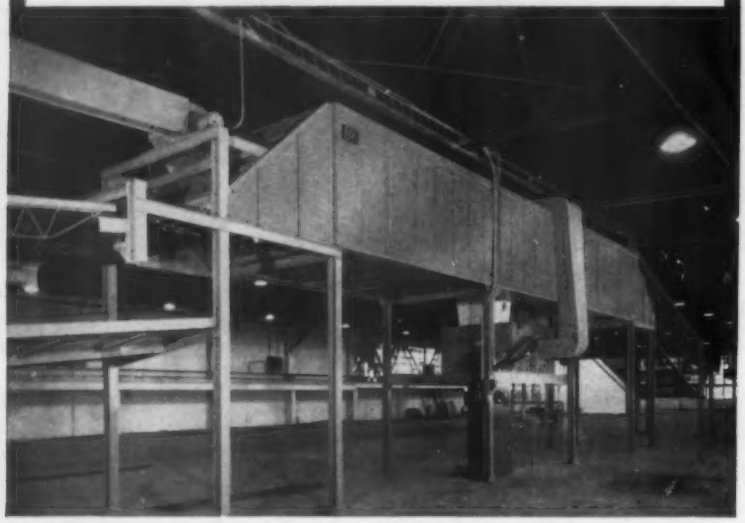
Next time you insulate a roof, specify FOAMGLAS roof insulation. Write Pittsburgh Corning Corporation, Department PE-99, One Gateway Center, Pittsburgh 22, Pennsylvania, for our new building insulation catalog. In Canada: 3333 Cavendish Boulevard, Montreal, Quebec.

PITTSBURGH pc CORNING

For more facts circle 529 on Reply Card

SLY INDUSTRIAL OVENS

Heavy Duty for All Needs



Sly Ovens insure better results, greater overall economy through efficient air distribution . . . close temperature control . . . maximum heat utilization . . . time-saving materials handling . . . space-saving installation. Like the "A" type oven pictured, all Sly Ovens are expertly designed and sturdily constructed to meet the particular job requirements. A complete line of conveyorized and batch types for all applications to 800° F.

See SLY for Savings Down the Line

DUST CONTROL SYSTEMS
Unequaled experience in system design plus the most extensive dust filter line. *Dynaclone* and *Automatic-Continuous* for uninterrupted, 24-hour-a-day service. *Intermittent* for non-continuous applications. Plus *"Unit"* and *"Economy"* filters.

INDUSTRIAL OVENS
Conveyorized and batch type for better results and increased savings on all baking, drying, finishing, and aging applications.

ROD BAKERS
Pit type in complete range of sizes. Reduce drying time of lime-coated rods from 30 minutes to 5. Designed to save space and coil handling time.

TUMBLING MILLS
Continuous and batch type. Remove fins as they clean castings — saving hours of machining.

BLAST ROOMS
In all types and sizes, with full mechanical return of abrasives. Thoroughly ventilated. Built to withstand years of heavy use.

PURAIR HELMETS
Complete protection against even the finest dust. Lightweight, comfortable. Maximum visibility, complete freedom of head movement.

UNIFLO NOZZLES
Steel with tungsten carbide orifice lining outlasts hard iron nozzles 200 to 1. For shot, grit and sand blasting.

PLUS . . .
Wear-resistant "Slyblast" hose. "Purair" blower units. Air pressure regulators. Abrasive elevating and cleaning units. Pressure blast tanks. Blast cabinets. Tilted blast mills. Gloves, aprons, canvas suits, leggings.

SEND FOR CATALOG describing complete line.

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

automatic alarm has not been installed to warn of dangerous temperature drop, the guard should be detailed to check the heating apparatus.

Not part of the sprinkler system itself, but a serious condition to be reported by the uniformed security guard, is any obstruction, such as merchandise piled high under sprinkler heads, that can seriously impair the system's ability to douse a fire. *From a release of Pinkerton's National Detective Agency, Inc., New York, N. Y.*

Sheeting Deep Excavations

A NEW CONTACT sheeting system in use on the 50-ft deep excavation for the new Boston, Mass. subway, uses random lengths of sheeting and fastening assemblies that are completely reusable.

Sheeting is applied, fastened in random length assemblies in subway excavation.

A number of slotted, steel clips are slipped on the flange of each soldier beam, previously driven into the ground. Random lengths of 3-in. by 10-in. sheeting, spanning two or more bays, are then placed against the face of the soldier beams and made fast with an 18-in. long high-strength steel bar, held by a ¾-in. diam bolt.

This system, developed by Contact Sheeting, Inc., New York, N. Y., requires little repacking. Berm can be removed while the sheeting is being installed. Sheeting

Change hats
with your maintenance man . . .

You'll find out, with . . .

Vertical Lift Metal-clad you perform normal breaker maintenance in 20 minutes

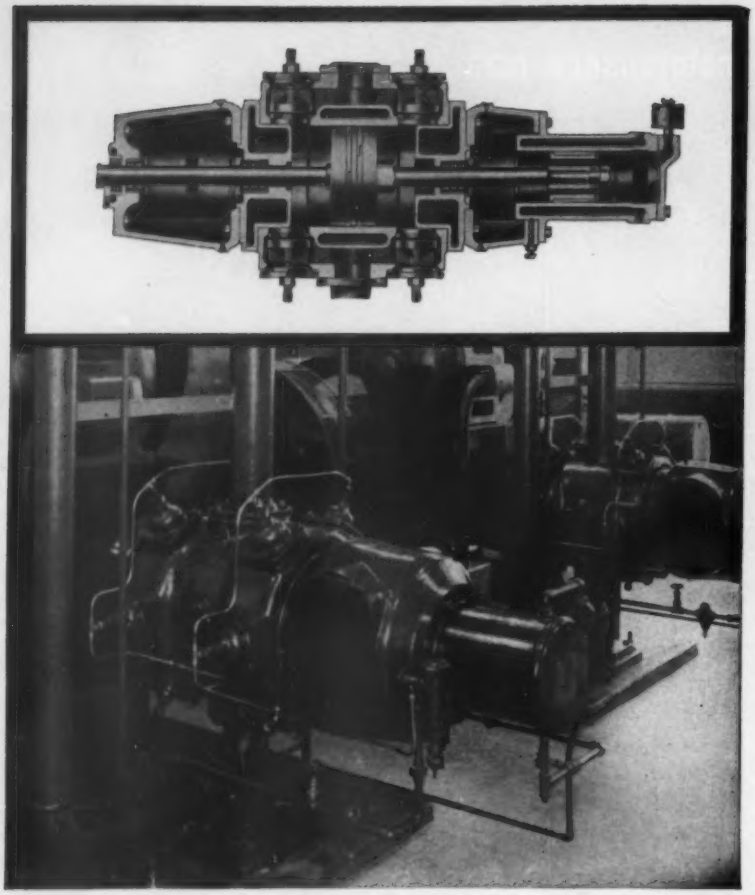
Ask your maintenance man which make of metal-clad switchgear is easiest and quickest to maintain, and it's an odds-on bet he'll tell you General Electric Vertical Lift.

He can show you why. For example, one man, in just 35 seconds, can remove the box barrier to inspect the contacts. The arc chutes do not have to be removed. In fact, he can complete routine maintenance of an entire Vertical Lift breaker in 20 minutes or less. Saving his time saves you dollars. General Electric Company, Schenectady 5, New York. 511-34

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 531 on Reply Card



with PENNSYLVANIA tailrod construction,

COMPRESSORS PROVIDE GUARANTEED OIL-FREE AIR...eliminate contamination

If your processes stand the chance of being ruined by the least contamination, better look into Pennsylvania Oilfre Compressors today. They are built specifically to eliminate any lubricant or oily vapor which would interfere with delicate instruments, contaminate food and beverages or be incompatible with chemical processes.

*Pennsylvania Oilfre construction is one reason that we can guarantee oil-free compressed air or gas. An extra long distance piece between compressing cylinder and main frame assures that no part of the piston rod which enters the lubricated frame will alternately enter cylinder stuffing box. Result: a compressor with isolated cylinder which will deliver air or gas guaranteed entirely free of oil or oily vapors due to lubricants. Pennsylvania tailrod construction produces a full floating piston which prolongs the life of carbon piston rings and eliminates the danger of piston riding against cylinder walls.

Get full details on Pennsylvania 3-ATC Compressors. Send for free copy of Bulletin 351, today.

PENNSYLVANIA PUMP AND COMPRESSOR CO.

Easton, Pa. • Earning customer confidence since 1920

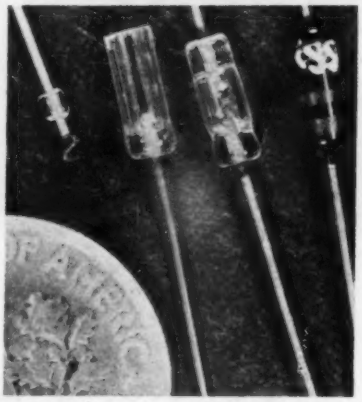
For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

can be applied against misaligned, twisted or off-line soldier beams. Most efficient sheeting takes place when 4-ft to 6-ft depths are sheeted in one lift. *From the New Mexico Professional Engineer, published by New Mexico Society of Professional Engineers, Carlsbad, New Mexico.*

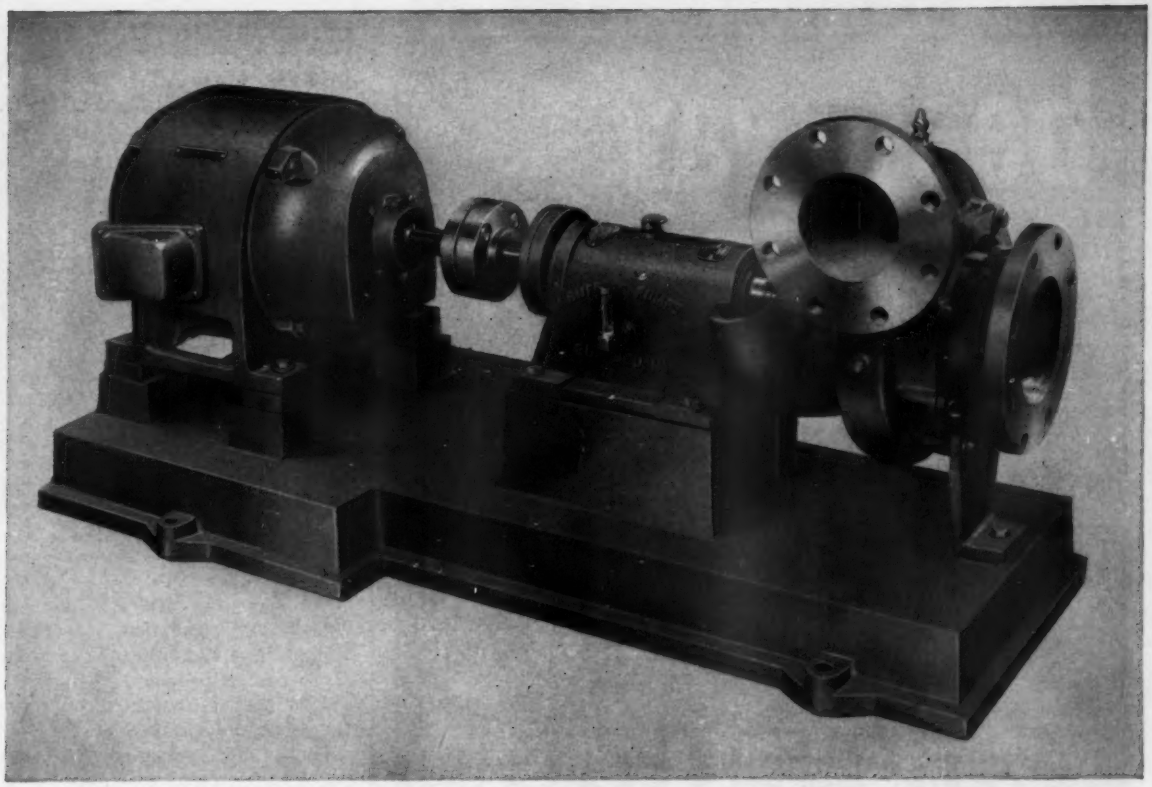
Ultrasonic Cleaning



Diode components are cleaned in ultrasonic bath at 40 C for three minutes at Sperry Semiconductor Div., Sperry Rand Corp. Bath is followed by flushing. Former cleaning method was mechanical. Comparison with a dime (lower picture) shows the size of the components. (From Branson Ultrasonic News published by Branson Ultrasonic Corp., Stamford, Conn.).

PVC-Lined Steel Pipe Eliminates Would-Be Corrosion

BEING A HIGHLY corrosive substance, coal slurry presented a handling problem to our engineers



YOU SAVE ON MAINTENANCE 3 WAYS WITH "BUFFALO" SINGLE SUCTION PUMPS!

1. Easier Accessibility to Inner Working Parts Cuts Servicing Time:

Open design mounting bracket allows quick access to stuffing box for gland adjustment.

Renewable wearing rings protect casing from wear. Rings only (not casing) need be replaced.

2. Interchangeability of Parts Thru Standardization of Parts Further Decreases Maintenance Costs:

Lower parts inventory costs and stocks.

Simplified, less costly inventory control.

3. Rugged "Buffalo" Construction Assures Long, Dependable Life & Minimum Maintenance:

Full ball bearing construction means long bearing life.

Long **overall** life is provided by oversize shafts, bearings, stuffing boxes — heavy-duty casings, stands.

"Buffalo" Full Ball Bearing Single Suction Pumps are tops in efficiency with rock bottom maintenance costs. For the full story, call your "Buffalo" engineering representative or write for Bulletin 976-G.

Many Applications For "Buffalo" Single Suction Pumps:

- General water supply systems.
- Corrosive & non-corrosive liquids.
- Saturated liquids and refrigerants.
- Viscous fluids.

"Buffalo" PUMPS

BUFFALO PUMPS

Division of Buffalo Forge Co.

166 MORTIMER ST. BUFFALO, N. Y.

Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

For more facts circle 533 on Reply Card

...t difficult pump-shaft ...g problem, and you've ...med the best reason for using a ...rg-Warner Mechanical Seal ...n that pump.

The real practical value of Borg-Warner Seals is their ability to seal *effectively* under the toughest extremes of temperature and pressure ...for toxic, volatile or corrosive fluids...and even some abrasive liquids. *Result*—less down time, elimination of expensive stuffingbox maintenance, and savings of the pumped fluid.

Borg-Warner Mechanical Seals

NOW AVAILABLE—a new file folder of Borg-Warner Mechanical Seal designs shows some of the many types and applications possible for pumps, mixers, autoclaves and for special rotating shaft problems. Send for your copy today—there's no obligation!

A PRODUCT OF B-W BORG-WARNER

Borg-Warner® Mechanical Seals

P. O. Box 2017, Terminal Annex, Los Angeles 54, California

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PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

Steel-jacketed polyvinyl pipe carries highly corrosive coal and water slurry.

when they designed a system to collect coal dust that was being vented into the atmosphere from three coal pulverizers.

The dust is collected by three gas scrubbers installed on the pulverizers. It is then mixed with water to form a slurry and pumped in slurry form a distance of 350 ft to a point where it is mixed with ore dust collected from the blast furnaces. If carried in ordinary pipe, high sulfur content of slurry would cause severe corrosion problem.

To prevent this problem arising, a new pipe, made in our mills, consisting of a polyvinyl chloride lining encased in a steel jacket, was selected for the job. For more than six months, the 3-in. Jal-Jacket pipe line has been conducting the coal slurry from pulverizers to collecting point. During this period, no trace of corrosion has developed.

In addition to the pipe's corrosion resistance, it can be installed easily as pipe lengths are joined by grooved couplings. It can handle working pressures of 1000 psi at 150 F. *From a release of Jones & Laughlin Steel Corp., Pittsburgh, Pa.*

Pneumatic Conveyor for Fluid Coke

COMPRESSED air is used to blow more than 1000 tons of fluid coke daily through three 5-in. lines from a fluid coker at the new Tidewater refinery to a new Delaware Power and Light Co. power station some 1000 yd away.

Coke is cooled at the coker and

Growers' Finance Company, Indianapolis, owner of the Truckers' Market, specified Stay Brite Aluminum Paint, a quality product of Colonial Refining & Chemical Co., Cleveland 14, Ohio.

ONE COAT OF STAY BRITE ALUMINUM AND OLD TRUCKERS' MARKET LOOKS LIKE NEW

Folks in Indianapolis can't believe the change in the old Truckers' Market. Almost overnight, a dull, dingy area was turned into one of the brightest spots in town. Major overhaul, expensive remodeling? No, just one coat of *Stay Brite* Aluminum Paint everywhere—on roofs, ceilings, sides, uprights. It upgraded the whole neighborhood.

Best protection for weather-exposed metal, a good aluminum paint like *Stay Brite* has exceptional hiding power—stains or old paint won't bleed through. On roofs, its high reflectivity turns back 70 per cent of the sun's heat, keeps interiors cooler. Indoors, reflective aluminum makes everything brighter, more attractive.

With modest investment, *your* plant or building can look new again. Specify an aluminum paint made with ALCOA® Pigments. It's the best buy—inside or out—for economy, protection and lasting good looks. Your painting contractor will agree.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two booklets, *Painting With Aluminum* and *Aluminum Roof Coatings Make Time Stand Still.* Perhaps the coupon will be convenient.

For more facts circle 535 on Reply Card

ALCOA ALUMINUM

Look for this label . . . it's your guide to the best in aluminum value

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

Aluminum Company of America
1740-J Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

☐ *Aluminum Roof Coatings Make Time Stand Still*
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Before pilferage gets out of hand . . . call

THE ANCHOR MAN—

expert in industrial protection

Pilferage—vandalism—trespassing—if one or more of these is a problem at your plant, put in a fast call to your Anchor Man. In a few minutes he can show you the many ways Anchor Fence is engineered for protection. For instance, how Anchor's exclusive square terminal posts give you added security by removing potential toe and hand holds. His visit could save you thousands of dollars in property losses and law suits this year alone.

Call your local Anchor Fence office today. Ask for the Anchor Man who specializes in your type of plant. For informative literature, write: ANCHOR FENCE, 6661 Eastern Ave., Baltimore 24, Md.

ANCHOR FENCE

Division of ANCHOR POST PRODUCTS, INC.

Plants in Baltimore, Maryland; Houston, Texas; and Whittier, Cal. Sold direct from factory branches and warehouses in all principal cities.

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

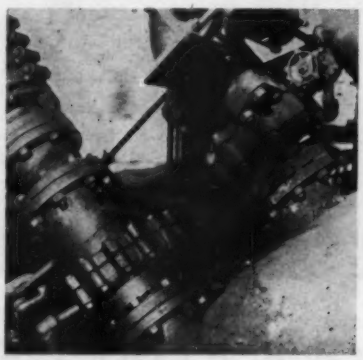
(Digest begins on page 42)

fluidized by aeration. It is then fed into the activators, each of which has 6000-lb capacity. When the activator is loaded, the inlet valve closes and compressed air is introduced.

At about 40 psi, a 6-in. cylinder-operated discharge valve opens and the coke moves into the airveyor lines. The discharge valve is a quick-acting, non-wedging gate valve.

The airveyor lines parallel the 20- and 24-in. main steam headers that carry up to 800,000 lb per hr of 600 psig steam to the processing areas.

The activator empties in 7 or 8 minutes (some 500 lb per minute). After the activator is empty, the air pressure drops, until, when it reaches 18 psi, a 4-in. cylinder-operated valve opens and vents the balance of the pressure into the atmosphere to expedite reloading.



When activator is full, 6-in. valve, left, opens and coke moves into conveyor lines. When empty, valve at right opens to vent balance of pressure.

Nerve center of the air-activated conveyor system is the remote control panel adjacent to the activators. The system operates either automatically or manually.

The discharge valve at the bottom of each activator is continuously air-purged to prevent coke from piling up in the seat, possibly damaging the valve and stopping loading. Since these valves are in hard-to-reach positions, they are operated from the remote control panel. *From a release of Everlasting Valve Company, Jersey City, N. J.*

Engineered Atmospheres for Better Processing

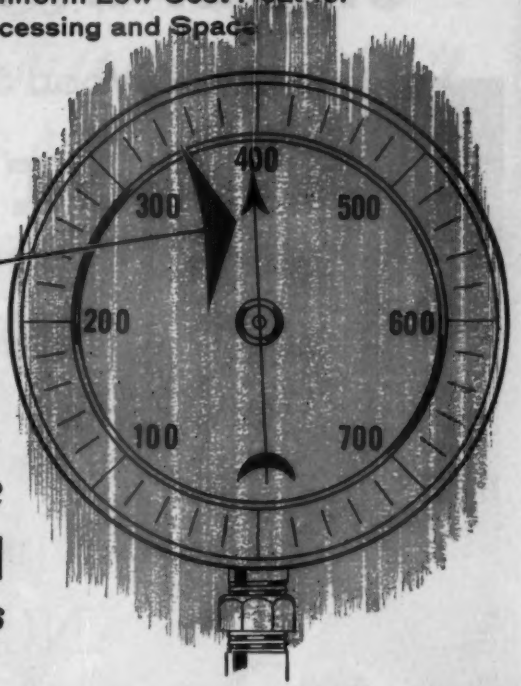
ROSS Air Systems

ROSS-SUPERTHERM

Uniform Low Cost Heat for Processing and Spac-

Close Tolerance

held by the SUPERTHERM *at high temperatures*



In the production of high quality shaving board, two major uses of controlled heat are required: platten presses and dryer. In each very little tolerance in temperature is allowed. At the Timblend Plant of Roddiscraft, Inc., at Arcata, California, for example, the temperature in the presses must be held at 290°F and in the dryer at 400°F with less than ±4°F variation in each.

When Ross Engineers took over the design of the heat service for this operation they had several heating media from which to select. The SUPERTHERM High Pressure Hot Water System offered the greatest advantages. It offered exceptional economy of installation and heat use, uniformity of delivered heat, and low maintenance.

Now in service for over two years, the records show that the SUPERTHERM System is doing just what it set out to do.

If you need a controlled process temperature up to 400°F or over, or combined heating and cooling or extensive space heating, you should consider the SUPERTHERM. In general, existing boilers can be utilized. In fact, many installations show a reduction in the number of boilers that must be kept in service.

MR

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

J. O. ROSS ENGINEERING

Division of Midland-Ross Corporation

730 Third Avenue, New York 17, N. Y.

ATLANTA • BOSTON • MT. PROSPECT, ILLINOIS
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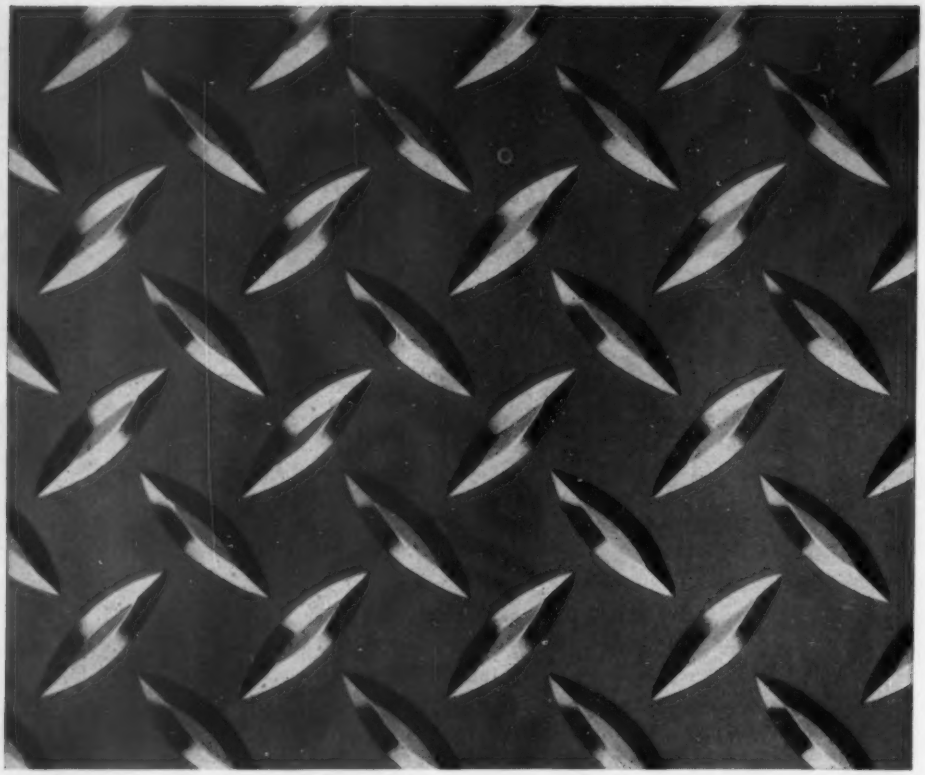
SHEAR IN ANY DIRECTION

Alan Wood Super Diamond Floor Plate

...IS EASY TO MATCH



The exclusive pattern of A. W. Super Diamond rolled steel floor plate lets you shear it in any direction on the plate . . . this flooring is easily matched. And, the arrangement of the pattern allows you to bend it at any place.

This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing. No chipping, splintering or cracking. And you can sweep it . . . hose it . . . mop it . . . A. W. Super Diamond is easy to clean from any angle. No pockets to hold dirt or water.

For easy fabrication and installation . . . for safety . . . for long wear . . . specify A. W. Super Diamond.

Write for Bulletin SD-N3.

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • Boston • REPRESENTATIVES: Atlanta • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

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"WE GOT THE BEARINGS WE NEED, —THANKS TO DISTRIBUTOR DAN THE SKF BEARING MAN

"That's fast delivery for you," the mechanic told the foreman. "Distributor Dan brought them over —from his own stocks. He's got hundreds of bearing sizes and variations in stock. So we're always sure of service when our purchasing department calls the SKF man *first*."

All Authorized SKF Distributors stock a large, diversified line of bearings—spherical, cylindrical, ball and tapered roller bearings—in countless sizes and variations. They offer you service, too, on bearings maintenance problems ranging from mounting to lubrication.

Why not find out exactly what the nearest Authorized SKF Distributor can do for you?

5915

Spherical, Cylindrical, Ball, and "Tyson" *Tapered Roller Bearings*

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

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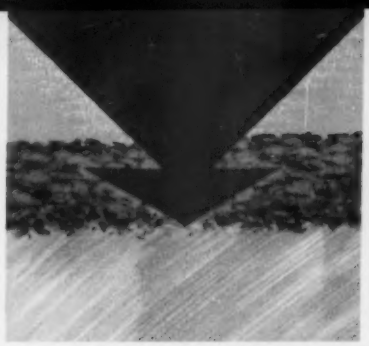
You
the
RUST-OLEUM®
RUST PREVENTIVE
STOPS RUST!®
BEAUTIFIES AS IT

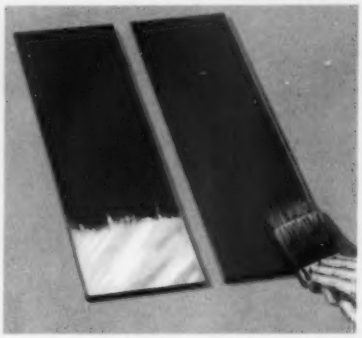
take brush!

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces. Saves costly surface preparations—lasts and lasts.



The **specially-processed** fish oil vehicle in the primer penetrates rust to bare metal—as proved in radioactive tracing studies.

Rust-Oleum, in its many forms, resists rain, fumes, heat, moisture, sun, and general weathering to stand up over the years.



Up to 30% more coverage with Rust-Oleum, depending upon the condition and porosity of the surface. Another Rust-Oleum difference.

See the many Rust-Oleum DIFFERENCES yourself!

Rust-Oleum primers and finish coatings are easily applied by spray. Flows smoothly . . . may be used in conventional, hot spray, or high pressure air-less spray.

A few easy strokes of the brush proves more than a thousand words . . . see how smoothly Rust-Oleum flows on . . . no pull, no drag . . . and it dries free of brushmarks. See, too, how much more coverage Rust-Oleum gives you . . . up to 30% more area depending upon the condition and porosity of the surface.

If your metal surfaces are *rusty*—simply brush or spray Rust-Oleum 769 Damp-Proof Red Primer right over the sound rusted metal after scraping and wirebrushing to remove rust scale and loose rust. The *specially-processed fish oil vehicle* in the primer penetrates rust to bare metal—driving out air and moisture. Easy as that to Stop Rust—and save time, money, and metal.

For *lasting beauty*—follow up with a Rust-Oleum finish coating in the color of your choice—from grays, greens, blacks, and aluminums to yellows, blues, whites, or browns—or from the many popular pastel shades.

That is the Rust-Oleum *System* of primer and finish coat for maximum over-the-years protection. A system that is measured by the money you save. Specify Rust-Oleum for maintenance, new construction, and re-modeling. Your Rust-Oleum Industrial Distributor maintains complete stocks for prompt delivery . . . he will be happy to consult with you on your coating problems.

What is your coating problem? What **color** do you need? Get lasting beauty in the color of your choice. Mail coupon for color charts.

SEE OUR CATALOG IN SWEET'S
OR WRITE FOR COPY

A matter of excellence.
Distinctive as your own fingerprint.

SEND FOR FREE TEST SAMPLE! ATTACH TO YOUR LETTERHEAD!

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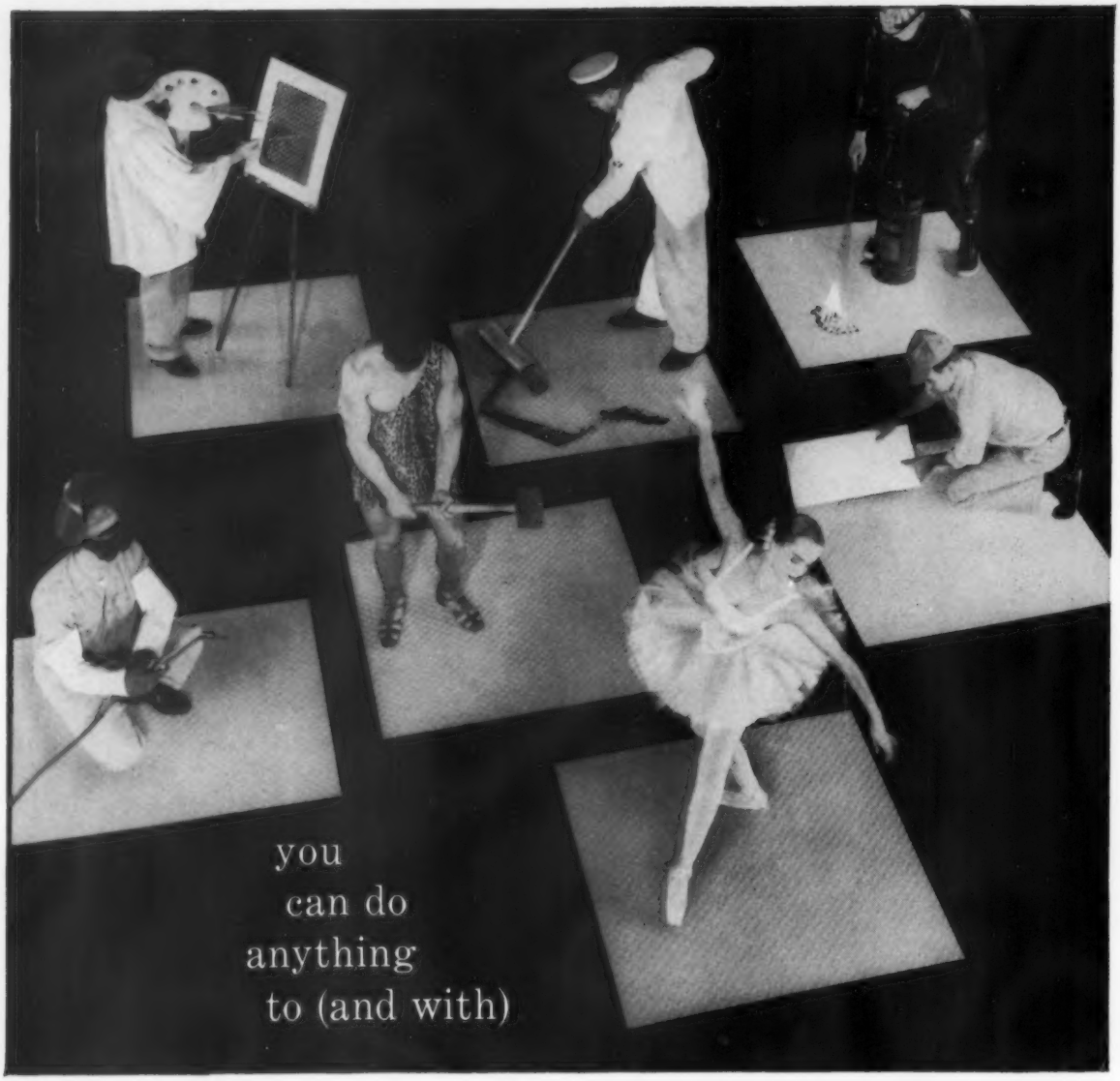
2981 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum fish oil penetration.



INLAND 4-WAY* SAFETY PLATE

As you can see, 4-WAY SAFETY PLATE is fireproof, can be bent, welded, hammered, painted. It can be cleaned with ease, can be cut, sheared, shaped to any curve or angle, drilled or punched. An outstanding feature of 4-WAY is its *slip-proof* character, as shown by the dancer. On catwalks, stair treads, truck beds, shop floors it provides positive traction, reduces hazards, safeguards employees.

Maintenance is extremely easy, fabrication and installation is simple. In many cases, no special skills are required—standard shop tools are all you need. On the floor, on the wall, on your machinery or your rolling stock, 4-WAY SAFETY PLATE is durable, attractive and economical. 4-WAY SAFETY PLATE is available from your Steel Service Center in Large Pattern—gages $\frac{3}{16}$" to $\frac{3}{4}$", Medium Pattern—gages 16 to $\frac{1}{4}$" and Small Pattern in 18 gage.

INLAND STEEL COMPANY

30 West Monroe Street • Chicago 3, Illinois

*Registered Trademark

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Now!... Convert Your RIDGID 300 POWER DRIVE to a fast, smooth, low-cost pipe and bolt threading machine!

"3 Efficient, New RIDGID Accessories Save Me Time on Every Job!"

A **RIDGID No. 310 Carriage** — Slip this strong, lightweight aluminum alloy carriage on the support arms of your RIDGID 300 Power Drive, and you'll get real cut-and-thread efficiency! Holds die head and cutter at your fingertips exactly like a pipe machine. No fumbling for right size threader . . . no tools to drop. Easy sliding . . . snugs right up to chuck for close threading and cut-off.

B **RIDGID Die Heads** — The time-saving RIDGID 535 Quick-Opening Die Head shown here, or any other RIDGID Machine Pipe and Bolt Die Head, snap-locks into carriage quickly, easily... eliminates slow back-off. Single adjustment on carriage centers die head exactly for true threads every time.

C **RIDGID No. 360 Cutter** — Full-floating, wheel-type cutter... wide rolls for straight cuts at pipe machine speed. Attaches easily with swivel drive pin. Fits 310 carriage only.

Die head and cutter operate independently . . . swing up and stay out of way when not in use. Add a RIDGID No. 19 Nipple Chuck and you can thread close nipples.

For a bargain in fast, easy work, equip your RIDGID 300 Power Drive with these accessories ... available individually ... at your Supply House!

RIDGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

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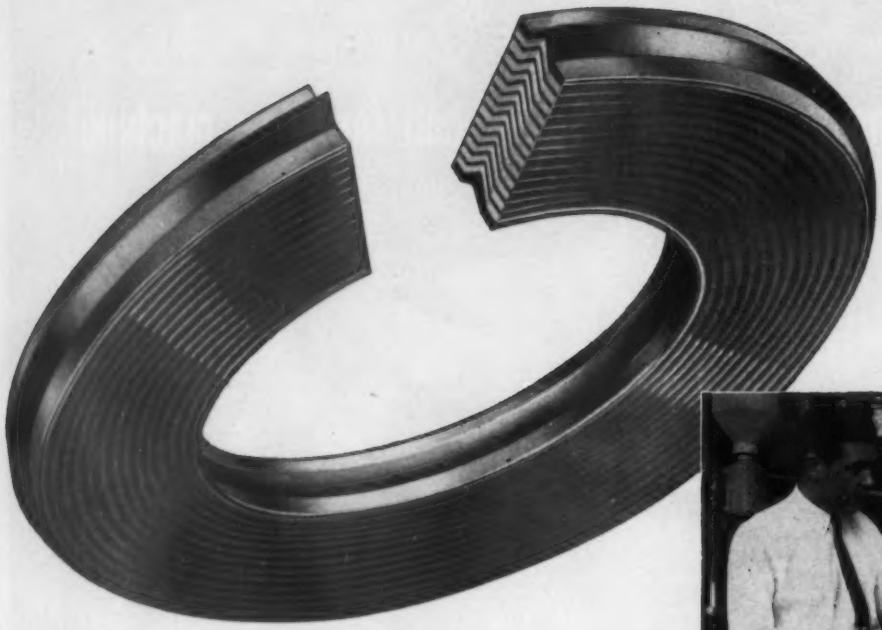
Why PLANT ENGINEERS with these



Automatic spring action of V-shaped metal plies react to variations in compression, internal pressures, and temperature changes. Assure leak-proof seal under most severe conditions.

GARLOCK GUARDIAN* GASKETS

Provide a safe, positive seal against high temperatures and pressures of steam, oils, gases, liquids.

Construction assures dependable sealing under varying service conditions. Strips of V-shaped metal, alternated with layers of asbestos or Teflon‡, are spiral wound to form the gasket. A predetermined density is introduced into the gasket to satisfy application requirements.

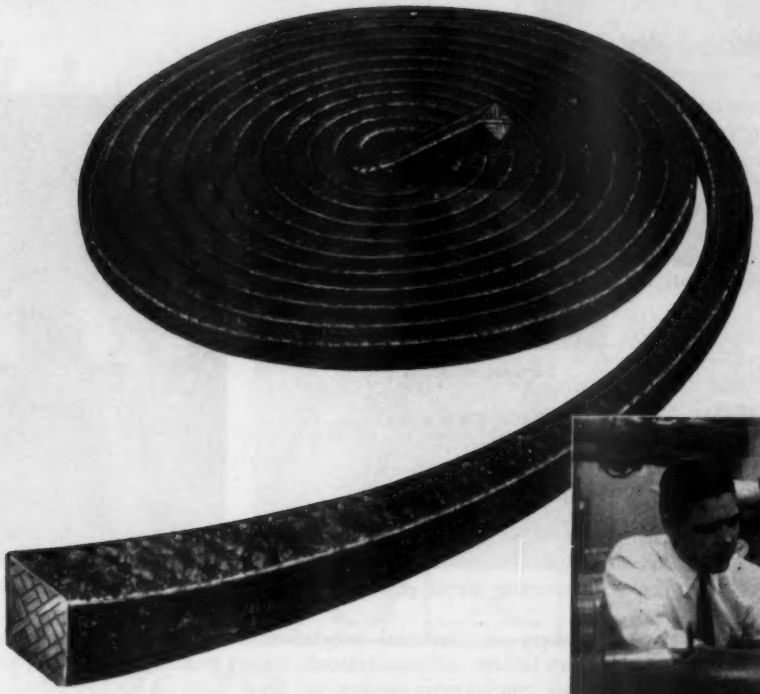
If you have sealing problems involving temperatures to 1050° F. and pressures to 2500 psi be sure to investigate the advantages of Guardian Gaskets. Available in round, oval, square, flat side, diamond, and pear shapes in practically any size. Write for descriptive folder AD-104.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Division: The Garlock Packing Co. of Canada Ltd.

protect equipment GARLOCK products



Lasts far beyond the limits of other packings . . . once installed, rarely requires further gland adjustment. Gives maximum service life over a wide range of temperatures, pressures.

GARLOCK LATTICE-BRAID* PACKINGS

Assure much longer packing life. Garlock Lattice-Braid Packings employ a through-and-through braiding construction. As illustrated above, each strand passes diagonally through the packing at a 45° angle. This unique construction makes a completely unified structure, resulting in greater strength. And, since there is no single outer braid to wear through, Garlock Lattice-Braid will wear far beyond the limits of ordinary packings.

This is only one of the many reasons why you should use Garlock Lattice-Braid on piston and valve rods of engines and pumps, expansion joints and valve stems. Write for Folder AD-131.

*Garlock trademark
‡DuPont trademark for T.F.E. Fluorocarbon Resin

THE GARLOCK PACKING COMPANY
Palmyra, N. Y.

For Prompt Service, contact one of our 26 sales offices and warehouses throughout the U. S. and Canada.

Plastics Division: United States Gasket Company

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OPERATION AND PRODUCTION —pointers for the industrial plant engineer

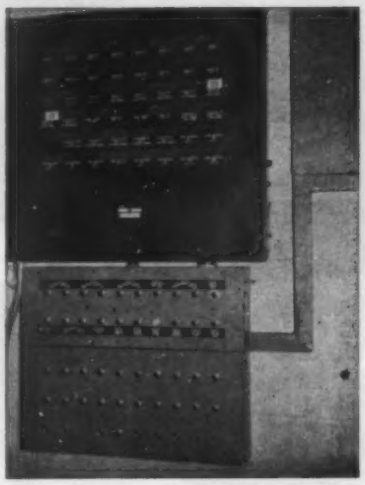
Edited by Vern Kempf

Central Alarm System Monitors Plant Equipment in Remote Locations

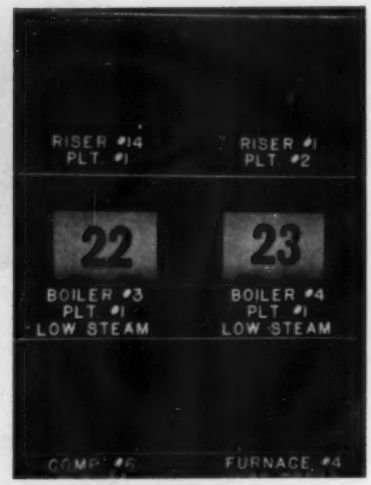
By K. F. Biddle, Plant Engineer Sundstrand Aviation, Rockford, Illinois

PROMPTED by the remoteness of some of our equipment due to the physical size of the plant, the unattended operation of automatic equipment and the importance of prompt knowledge of any equipment failure, we have felt the necessity of a central equipment alarm system.

Consequently we installed two annunciator drop panels—one at our maintenance office and one at the guard office. The latter is continually manned with guards who can contact the proper personnel when the plant is otherwise unattended. When an annunciator drops, an audible signal alerts the guard who checks the visual signal identifying the source of trouble.



Annunciator panel pinpoints trouble.



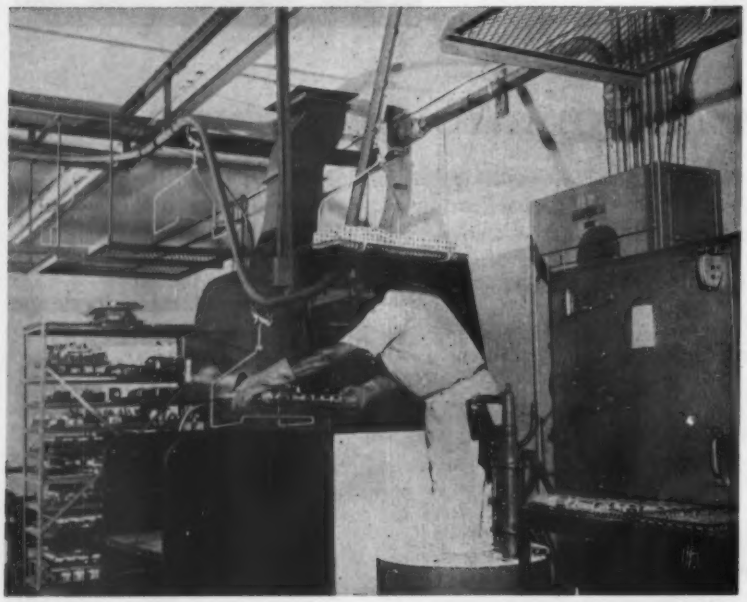
Panel drops signal low steam pressure.

Among the items we monitor are flow signal devices in the risers of all sprinkler lines, our master clock and clock booster stations, circuit breakers on electrical substations, steam boilers, air compressors, major air conditioning equipment, certain circulating pumps on heat exchanger systems, a critical air filtering unit and gas pressure in the heat treat department.

In addition to the annunciator drop, which will indicate low steam pressure for example, there are also signal lights which indicate that equipment is servicable although not necessarily on the line. Again, in the case of steam boilers where more than one boiler is on a header, we would be aware that one boiler is out of service before the demands for steam exceeded the capacity of the remaining boilers. In the past our first warning of boiler failure might not occur until the building temperature started to fall.

In the event that any sprinkler head is discharged, a flow alarm indicates its location in the plant enabling us to dispatch help to that area immediately.

Lightweight Overhead Conveyor Conserves Floor Space



Dipping down only at work stations, a simple material handling system is saving valuable floor space at the Leach Corporation, Los Angeles, California. Produced and installed by Chainveyor Corporation, the 310-ft system forms a single loop from the receiving room through the plant's assembly section.

Tubing Bent to Small Radius

TOP-QUALITY bends in thin-wall tubing are being made by a flexible ball mandrel developed at Boeing Airplane Company, Wichita, Kansas. Called the "free-flex" mandrel, it is easy to use, versatile and more durable than previous designs.

Mandrels are used to prevent flat-

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE STEEL SHELVING

quickest BECAUSE...

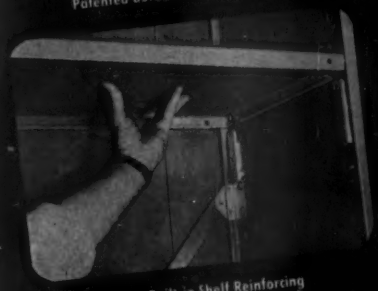
. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

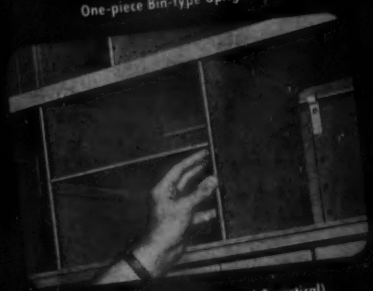
THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

Patented Boltless Shelf Bracket


Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright


Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts

Bottom Shelf Support and Floor Angle

DELUXE METAL PRODUCTS CO. • WARREN PA.

DELUXE METAL PRODUCTS COMPANY

A DIVISION OF *Royal* METAL MANUFACTURING CO.

For more facts circle 544 on Reply Card

OPERATION — PRODUCTION

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Half-section of tubing shows how mandrel prevents crushing during bend.

tening or crushing of tubing during the bending process. The new mandrel has a threaded pin with a spherical head to interconnect a series of steel balls. The head of the pin fits into a spherical seat in the ball, permitting movement in any direction. This design and construction combines the flexibility of a cable mandrel with the strength of a link mandrel.

One of the important features of the new design is that it produces bends with a radius only twice the diameter of the tubing. License to manufacture the device has been granted to Pines Engineering Company, Inc., Aurora, Ill. The mandrels will be available in diameters from one inch to six inches.

Scale Adapter Reduces Damage When Weighing Long Material

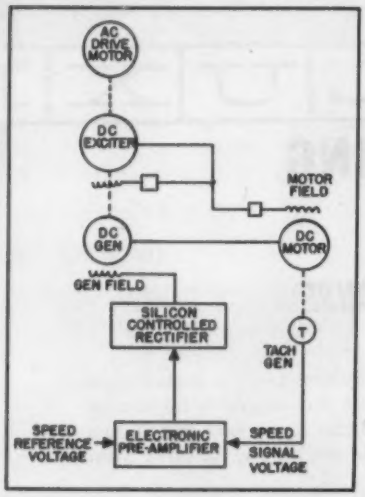
BY PERMANENTLY installing a heavy steel plate adapter to a standard industrial scale, Rolled Steel Corporation, Skokie, Ill., is now able to weigh steel materials as long as 30 ft without damaging the material. The addition of a six foot by 20-ft structural iron frame enables the four foot by eight foot pit scale to weigh materials of any width in lengths up to 30 ft.

Although materials must be centered on the scale to obtain precise weight, the platform lends the scale a versatility far exceeding that of normal industrial scales. For example, the scale can be used to accurately determine the total weight of a number of small items as well as such difficult-to-handle items as plates, bars and structurals.

Silicon Controlled Rectifier Reduces Drive Maintenance

SILICON controlled rectifiers have been successfully applied to a high-accuracy paper mill drive system installed at the Wisconsin Rapids Division of Consolidated Water Power and Paper Company.

Developed by General Electric Co. about a year ago, the efficient silicon controlled rectifier has previously been used only in small equipment and in a variety of test



Silicon controlled rectifier supplies excitation to generator field windings.

setups. In this paper mill drive application, the tiny solid-state device serves as a power amplifier in the regulating system of each of five new sections added to an existing paper machine.

Two coaters, two dryers and a calender-reel have been added to the 138-in. machine to increase its utility for modern paper production. In each of the five new sections, the controlled rectifier serves as the power amplifier in a regulating circuit which also employs a preamplifier, a tachometer and a tensiometer feedback.

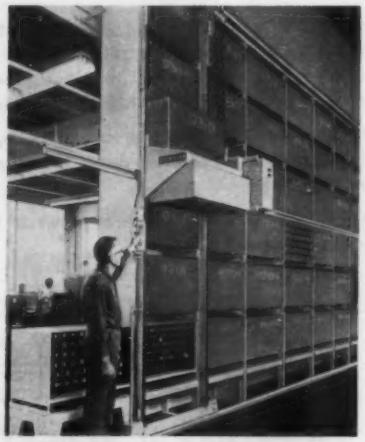
The controlled rectifier performs the same functions as do magnetic amplifiers, rotating amplifiers and electronic power tubes. It is, however, only about one-fifth the size of the electronic tube and is claimed to have a far greater maintenance-free life.

Storage Wall Conserves Space

USING SELECTIVE electrical control, a mechanical storage system picks up a load to be stored, transports it horizontally and vertically to any desired area in a storage wall, then rolls it gently into a protected and dust-free drawer or compartment. Retrieving of the load, in the exact condition in which it was delivered to storage, is accomplished with the same automatic ease.

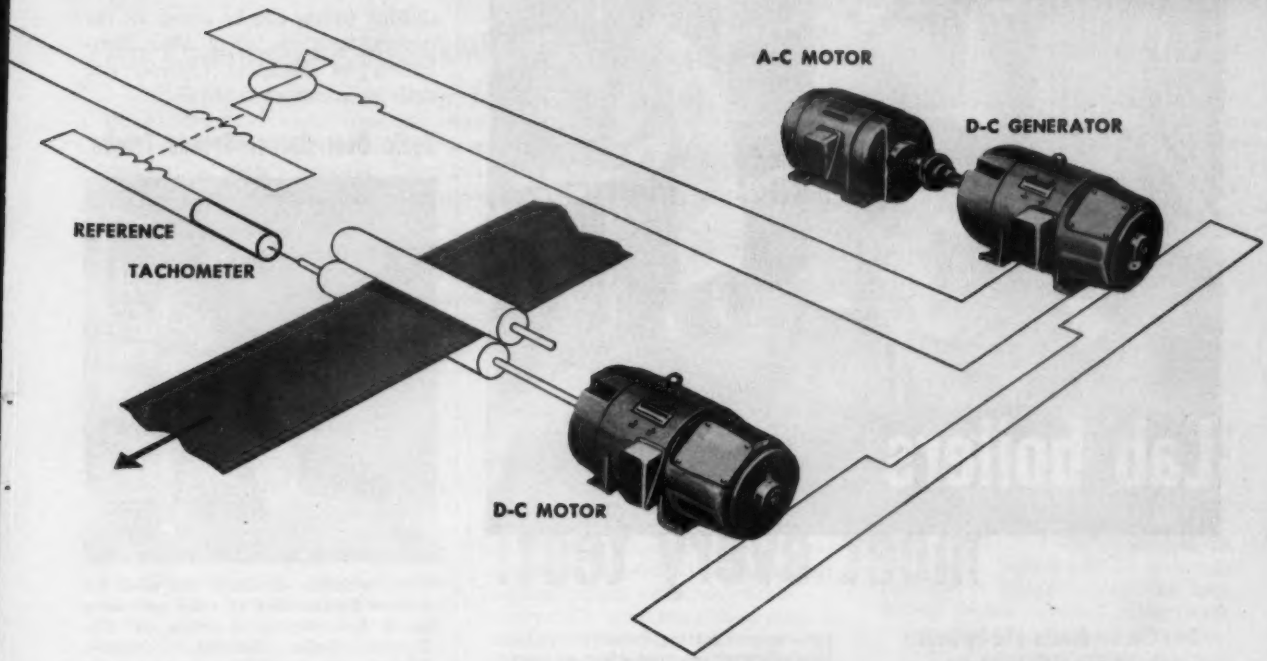
Called the "Retriever," the system is made up of an electrically-operated traveling carrier, steel storage drawers and a compact loading or transfer station. Manufactured by Triax Equipment, Cleveland, tiers of drawers can be added horizontally or vertically to make the storage wall as long and as high as desired. Virtually any item from trays of parts to heavy-duty electric motors can be handled, with storage up to 4000 lb in a single compartment. Dimensions of the compartments can be tailored to any needs.

Labor costs are cut to a minimum, since no special operator is needed to move, store and stack the loads. Time now being wasted in looking for the right parts or



Electrical controls enable carrier unit to bring loads to or from compartment.

D-C DRIVES FOR PRECISE CONTROL



Problem: How to obtain precise control of machine speeds without human direction

Automation's most important requirement—*self-control*—enables machines to process work continuously with minimum human effort. This is why the trend to continuous automatic processing is a trend to direct-current drives. *For d-c can best supply the precise regulation and self-control that enables a machine to correct its own errors without human direction.*

Feedback—the heart of automation—compares machine output with pre-established standards. Deviations are corrected automatically, instantaneously. This is just one example of d-c's modern capabilities.

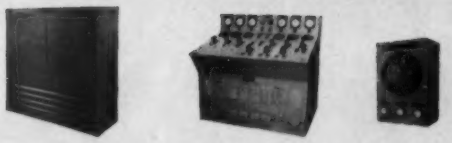
If you are seeking more automatic, lower cost means of production, it will pay you to investigate direct-current drives. A new booklet, "WHY D-C?", written for modern industry's management team, is available to help you. For your free copy, write *Section 829-4, General Electric Company, Schenectady 5, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

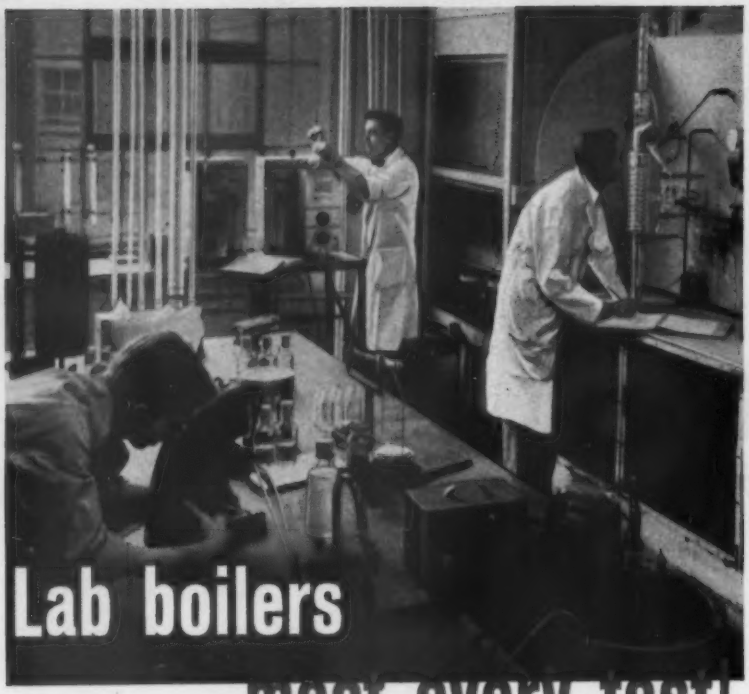
SELECT FROM GENERAL ELECTRIC'S COMPLETE LINE OF D-C DRIVES

MOTORS AND GENERATORS



POWER UNITS AND CONTROLS

For more facts circle 545 on Reply Card



Lab boilers meet every test!

Two Cleaver-Brooks 150-hp boilers satisfy all demands for steam at Shell Chemical Corporation's Union, New Jersey Technical Service Laboratories

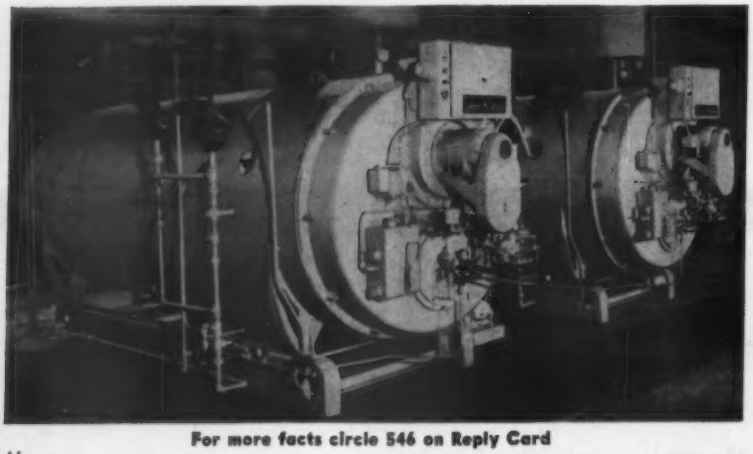
"We find Cleaver-Brooks boilers meet every test we have given them for top operating performance," reports George Baranchulk, utilities and service engineer at Shell's research building. Mr. Baranchulk goes on to say, "There is extreme versatility to our load as our requirements for heating and experimentation may run as low as 10 hp in the summer to over 140 hp in the winter. Checks we have made of CO_2 and stack temperatures indicate we are getting excellent operating efficiency — even when we vary the load over widely separated peak and low demands. These boilers have definitely lived up to every claim you have made for them."

Put Cleaver-Brooks packaged boilers to the test! They are available in sizes from 15 to 600 hp . . . for oil, for gas or for oil/gas combination firing. Contact your representative or write Cleaver-Brooks Company, Dept. K, 364 E. Keefe Ave., Milwaukee 12, Wisconsin.

Cleaver Brooks®

ORIGINATORS AND LARGEST PRODUCER OF PACKAGED BOILERS

TESTING — Fully modulated Cleaver-Brooks boilers burning No. 6 oil supply steam for heating presses, constant temperature rooms, laboratory uses, laminating plastics and air conditioning system. Sold and serviced by Miller & Chitty Company, Union, N.J.



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OPERATION—PRODUCTION

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shifting pallets can be saved, as the system finds the right load completely by electrical control, and delivers it automatically.

Sonic Door Opener Speeds Trucks

Sonic whistles eliminate the need for drivers dismounting to open and close doors for straddle carriers at The Timken Roller Bearing Company. Whistles are located in the cabs of the carriers and a receiver is mounted above the door. When the driver presses a button, the sonic signal activates the motor, opening the door.

Wiring Jig Saves Time

By Harvey Holz, Supervisor, Small Parts Dept., Magnaflux Corporation, Chicago, Illinois

USE OF WIRING JIGS, harnesses and looms is not a new idea but we began to use them about five years ago on orders for as few as five or six units with considerable savings in labor and material.

Our first step was to try to simplify the wiring in the units as much as possible. When this has been done, the completed wiring is removed and spread out on a suitable ¾-in. board. Wire positions are marked and guides are installed where wires are located and where they start and end. In some cases, plugs, terminal boards, lugs, switches or other devices are used instead of fittings as this greatly simplifies the later installation of the wiring into the control panel.

After all wires are properly positioned, taping every six or 12 in. will hold them together for removal from the jig. A special machine is used to completely cover the wires

Hall Industrial Water Report

VOLUME 7 SEPTEMBER 1959 NUMBER 5

Air Conditioning Means Water Conditioning

To the layman air conditioning means air cooling—nothing else. But the engineers who must operate large air-conditioning systems know the part that water plays in the condensers, air washers, humidity control and chilled water systems. They know too, that they need help to prevent the troubles with scale, corrosion and biological growths that occur wherever water is used.

Hall engineers are ready to give the help needed. They are trained to tackle the specific water problems encountered in air-conditioning systems, just as they are trained to assist you in making water in all industrial operations behave . . . from the source, on through boilers, service systems and process to final disposal.

Big Trouble With A Small Unit

When a Pennsylvania university installed a small air-conditioning system, operation was begun without water treatment. The water used was corrosive. After seven months copper condenser tubes in the refrigerating unit were pitted and perforated. So were steel condenser water boxes and baffle and the steel recirculating water receiving tank. Estimated cost of repairs was more than $10,000.

After this bad start Hall engineers were called. R. A. Danesi recommended replacement of the ruined copper condenser tubes with tubes made from a more corrosion resistant copper alloy. He also recommended conditioning of the cooling water with polyphosphate and set up rigid control of pH and blowdown. Two inspections during the next year revealed negligible loss of metal.

In this case, operating personnel were not aware of the necessity for water conditioning. Future trouble will be avoided by carefully following recommendations.

Dispersive Stops Scale

A Los Angeles building frequently had to clean heat exchangers in the air-conditioning system. The water, high in temporary hardness, attained a pH of 8.2 to 8.5 and produced calcium carbonate deposits when concentrated only one and one-half to two times. Treatment with the slowly soluble polyphosphate Micromet® largely eliminated the calcium carbonate but the system became dirty with calcium phosphate.

Hall engineer L. Arnold first considered reducing the pH of the water with sulfuric acid to stop the calcium phosphate precipitation. Building operators wanted to feed acid but the money needed to purchase feeding equipment was unavailable.

Arnold's next suggestion was to supplement the Micromet with some Hagan dispersive for minimizing accumulation of the calcium phosphate. This was done, and during the next air-conditioning season the heat exchangers were not once taken out of service for cleaning. When opened at the end of the season, they were found to be cleaner than they had been in the spring.

The Missing Bromide

Hall engineer G. E. Starr received a rush call for help from a southern hospital. Boiler water chloride tests gave results as high as 1000 ppm compared to a normal 100 ppm, even though the continuous blowdown valves were wide open.

The unusual condition set off a systematic search for the source of contamination. Plant testing was checked and found to be satisfactory. Conductivity tests on boiler water samples showed that the contaminant made up the major portion of the dissolved solids. This led the search to the zeolite softener used to treat makeup water for the boilers. No salt contamination of treated water was found.

The only place left to check was the condensate, which was found to be badly contaminated. A check of all sources of condensate ended at the absorption refrigeration machine where lithium bromide—not chloride—was leaking into the steam coils in the generator. The bromide was showing up in the chloride test.

Immediate repair of the leak not only stopped the contamination of the boiler water, but also the loss of expensive lithium bromide.

Absorption Refrigeration Machines

Absorption systems are very sensitive to scale. Temperature differentials across the condenser are not very great to begin with, and heat transfer falls off markedly as deposits accumulate in the condenser.

Formation of deposits is encouraged by the fact that the controls respond to light loads by reducing the flow of water through the condenser, rather than by cutting back the supply of steam to the generator. Water temperature rises and the formation of deposits is accelerated.

Serious corrosion of tube sheets in condensers and absorbers can occur because of galvanic action between copper tubes and steel tube sheets. Two methods of tackling this problem are to use corrosion resistant alloys for fabrication of tube sheets or to coat tube sheets with protective coatings. In addition, water conditions must be carefully controlled.

All of this points to the importance of water conditioning for uninterrupted operation. Engineers skilled in this work can be of real help to you.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems write, wire or call address below.

Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.
In Canada: Hagan Corporation (Canada) Limited, Toronto

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 547 on Reply Card

WANT TROUBLE-FREE VENTILATION?

"Buffalo" 108" Dia. Propeller Fans

These Versatile "Packages" are Your ECONOMICAL ANSWER!

"Buffalo" builds a complete line of propeller fans to fill your exact ventilating needs. *Big* fans up to 250,000 cfm capacity . . . down to smaller fans starting at 500 cfm.

- **Economical to Install** — Complete fan "packages" are delivered ready-to-run. Easily installed in windows, walls, on the floor.
- **Economical Operation** — Maximum propeller fan efficiencies mean peak ventilation at minimum power costs.
- **Trouble-Free Long Life** — These fans are ruggedly built to stand up to heavy-duty industrial ventilation or exhaust. Panels are heavy gauge sheet steel or steel plate. One-piece welded assembly includes die-formed arms, bearing and motor supporting plates.
- **Versatility** — Special construction is available for corrosive, high temperature or non-sparking applications.

"Buffalo" Packaged Propeller Fans can be the economical answer to many of *your* ventilating jobs — big or small. For complete facts, call your nearby "Buffalo" engineering representative. Or write direct for Bulletin FM-315.

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166 Mortimer St. • Buffalo, N. Y.
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"Buffalo"

INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS-EXHAUSTERS
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OPERATION—PRODUCTION

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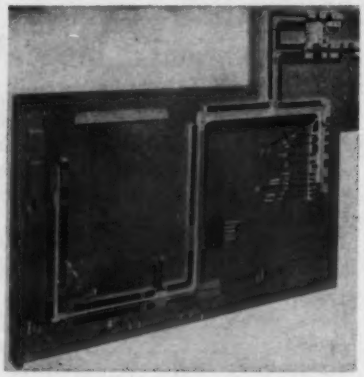


Simple wiring jig speeds assembly of special control panels and reduces cost.

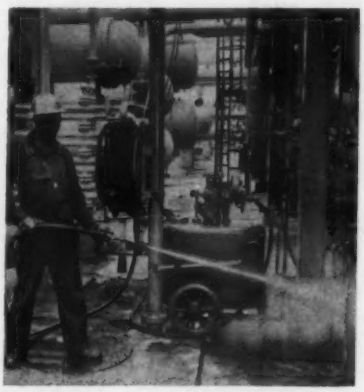
into a loom. The loom is now ready to be placed into the panel and fastened to the proper connections.

We have made about 25 wiring jigs so far with an average time of three hours to make each one. A savings of at least 50 per cent has been realized on wiring time using these jigs.

Hydraulic Jet Keeps Plant Clean

HYDRAULIC JET CLEANERS used at the Port Arthur Refinery of the Gulf Oil Corporation have reduced plant housekeeping to a simple brief routine. The units, made by Sellers Injector Corporation, are located at stations with piped connections for water and steam. Some 200 ft of ¾-in. hose permit cleaning within this radius from the unit.

Operating on ordinary plant



Detergent, steam and water, flowing through injector, scrubs equipment.

3M Announces... **NEW**...the miracle production cleaning material...

SCOTCH-BRITE®

Cleans better, cleans faster, costs less!

We'll prove it on your toughest cleaning jobs!

What do you have to clean?—raw stock, product parts, production equipment? We've tested and proved "SCOTCH-BRITE" Brand Cleaning Material for them all—for example, conveyors, tanks, bins, and vats, on flat metal, tubing, glass molds, printing plates, printed circuits, on metal/plastic combinations and many others.

You've never seen anything like new "SCOTCH-BRITE" material: a tough, springy, web-like pad of nylon filament with small working particles of abrasive mineral. Lightweight, long-wearing, easy to bend, fold or cut to shape. Let us show you how easily "SCOTCH-BRITE" loadings can replace your present power brushes, on almost any fixed or portable hand or automatic cleaning equipment!

We'll prove it with your present equipment!

See for yourself how "SCOTCH-BRITE" Brand Cleaning Material outcleans and outlasts wire brushes, fiber brushes, steel or other wools—and at lower initial cost, too! It wipes away dirt, grease, wax, stains, scale or oxides; follows complex contours that bristles can't reach—and rinses clean without rusting or staining!

We'll prove it—at no obligation to you!

3M Co., 900 Bush Ave.,
St. Paul 6, Minn., Dept. ABQ-99

Please call to arrange a free demonstration of "SCOTCH-BRITE" material on our cleaning operations.

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POSITION_____

COMPANY_____

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MINNESOTA MINING AND MANUFACTURING COMPANY
3M COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

The term "SCOTCH-BRITE" is a registered trademark of 3M Co., St. Paul 6, Minn. Export: 99 Park Ave., New York 16. Canada: London, Ontario

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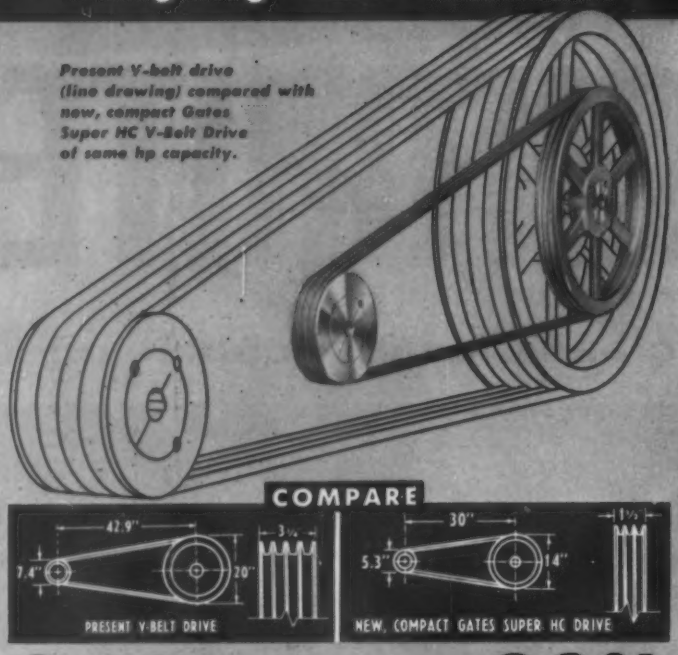
Designing NEW DRIVES?



Save up to 20%

with new high capacity V-belt drive

When you change the whole drive — both V-belts and sheaves — remember: The cost of a Gates Super HC V-Belt Drive is as much as 20% less than the cost of present V-belt drives of the same horsepower capacity.

A development of Specialized Research in the world's largest V-belt laboratories at Gates, the new Super HC V-Belt makes possible the most compact, lightest-weight, lowest-cost multiple V-belt drive you can put on any machine!

Cuts drive space as much as 50%

With Gates new Super HC V-Belt, sheave diameters and widths can be reduced 30% to 50%, center distances 20% and more. Bearing load is lightened and total space occupied by the drive may be cut as much as 50%.

"The Modern Way to Design Multiple V-Belt Drives" is an informative handbook on the Super HC Drive, available from your nearby Gates Distributor listed in the Yellow Pages of your phone book.

The Gates Rubber Co., Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ont.
World's Largest Maker of V-Belts

TPA 439

Gates SUPER HC V-BELT Drives

For more facts circle 550 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 62)

steam and cold water, the venturi-injector design boosts discharge pressure to almost 2⅓ times the inlet steam pressure. This provides a powerful hydraulic scrubbing action at a stream velocity estimated at two miles per minute. Effectiveness of cleaning is further increased by the temperature of the stream, around 140 F, and by the addition of a detergent. The detergent is drawn from a 55-gal storage drum in pre-set proportions.

Vacuum Deposition of Cadmium Solves Embrittlement Problem

VACUUM DEPOSITION of cadmium by a low cost method now makes it possible to protect high tensile steels against corrosion without danger of hydrogen embrittlement. Developed jointly by NRC Equipment Corporation and its parent National Research Corporation, the method compares favorably to electroplating with respect to process cost and quality of plating.

Samples, some of which have been flexed repeatedly are reported as having successfully passed 96 hour salt spray and salt bath tests without trace of corrosion. In one bend test, the sub-strate failed before the coating.

Expected to find immediate application in industry, the process is used on parts made of high-strength heat-treated steels which tend to become embrittled when electroplated. This occurs because the acidic components in the plating bath cause the surface layer of the steel to absorb hydrogen. In vacuum coating, no hydrogen is present either from acids or from the air and embrittlement cannot occur.

The cadmium plating process is related in principle to the well known vacuum metallizing method now used to decorate plastics, die castings and metal stampings. In the decorative metallizing application, a film only a few millionths of an inch thick is applied by vaporizing aluminum inside an evacuated chamber and condensing it on the parts. This is done by hanging a small aluminum staple on tungsten

wires which are heated to incandescence by electrical current. The heat from the tungsten filaments is transferred to the aluminum staples which evaporate and then condense on the parts.

Whereas the thin flash film of aluminum is adequate for decoration, it is too thin to stand up to hard usage unless protected by a lacquer top coat. The cadmium process differs from this technique not only in the metal being vaporized but also in the thickness and crystalline structure of the coating being applied.

While the decorative coating appears optically opaque, it contains microscopic passages through which corrosive materials can attack the sub-strate. In the cadmium process, special techniques are used to produce a hole-free homogeneous coating which will assure an effective barrier.

In practice the process poses no special problems. Equipment requirements are met by a modified version of one of the standard decorative metallizers which have proven their reliability in hundreds of installations. Operators require no special skills and can be readily instructed in the process.

Spring-Action Hanger Reduces Dock Light Maintenance

A spring-action overhead loading light has been developed by the Pyle-National Company, Chicago. The unit consists of a telescopic device with a gooseneck extension arm which suspends a wire-guarded light. In use, the extension arm is pulled down by a dock workman and hooked under the car roof. Held in place by spring tension, it releases itself if the car moves.

Improved Gates Vulco Rope gives you 2 important advantages

1. 40% higher hp rating at no increase in price: This important cost-saving advance is the result of Specialized Research in the world's largest belt-testing laboratories at Gates. As replacements on standard drives these V-belts with 40% more load-carrying ability give longer service life...reduce down-time, cut belt replacement costs.

2. Concave Sides (U. S. Pat. 1813698): The sides of Gates Belts are concave (Fig. 1). When the belt is bent around the sheave, the concave sides fill out—become straight—for full, uniform contact with the sides of the sheave groove (Fig. 2). Uniform contact insures maximum pulling power...even distribution of wear...longer life.

Available in all sizes from your nearby Gates V-Belt Distributor listed in the Yellow Pages of your phone book.

When designing new drives
use Gates new Super HC V-Belts and Sheaves.
See opposite page.

The Gates Rubber Co., Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ont.

World's Largest Maker of V-Belts

Gates

TPA 432

Gates Hi-Power VULCO ROPE V-Belts

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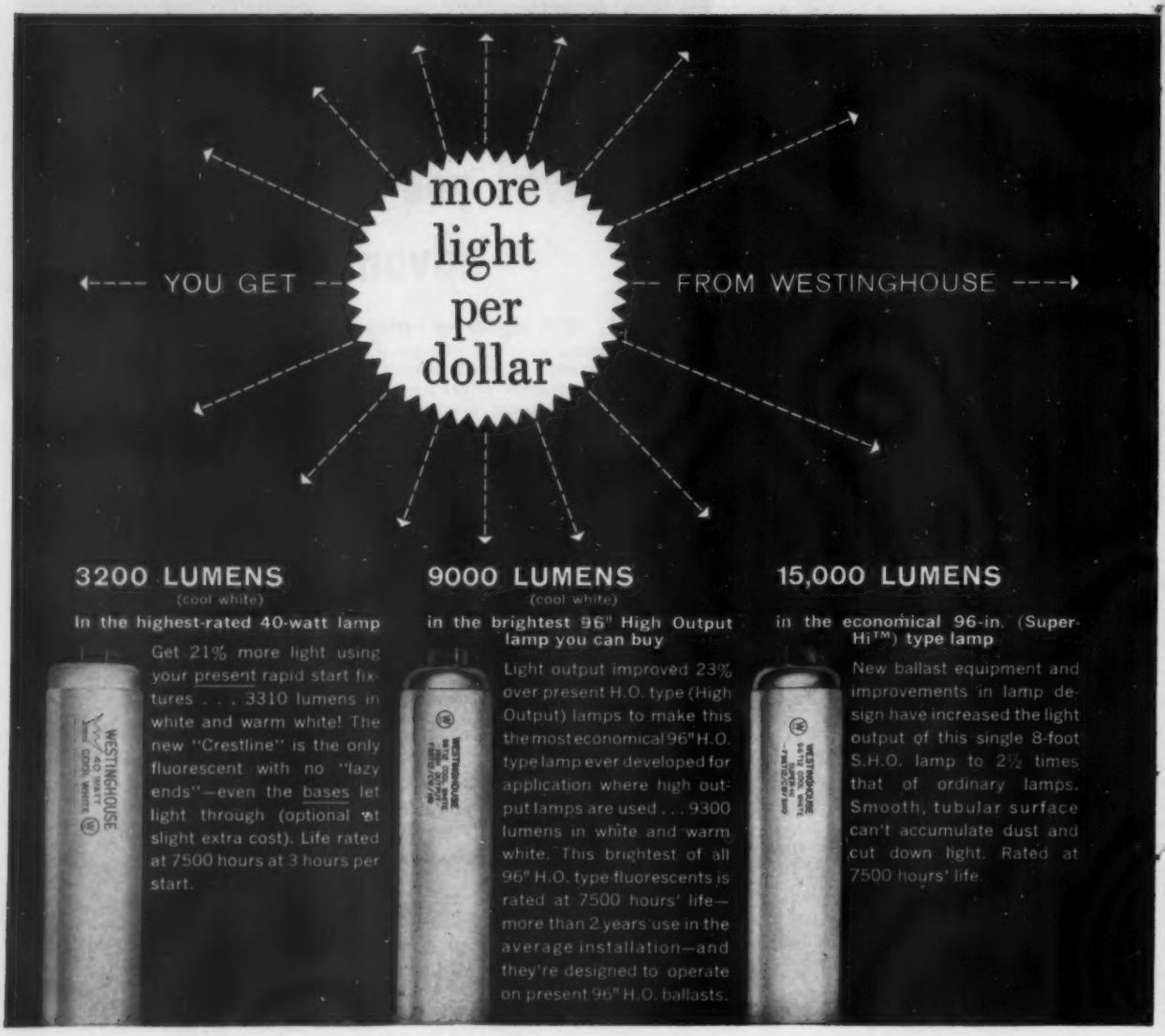
NOW! *One new, brighter 40-watt lamp does the*

2800

NEW "UNIVERSAL" PREHEAT-RAPID START LAMP



3200 LUMENS
(cool white)

In the highest-rated 40-watt lamp

Get 21% more light using your present rapid start fixtures . . . 3310 lumens in white and warm white! The new "Crestline" is the only fluorescent with no "lazy ends"—even the bases let light through (optional at slight extra cost). Life rated at 7500 hours at 3 hours per start.

9000 LUMENS
(cool white)

in the brightest 96" High Output lamp you can buy

Light output improved 23% over present H.O. type (High Output) lamps to make this the most economical 96" H.O. type lamp ever developed for application where high output lamps are used . . . 9300 lumens in white and warm white. This brightest of all 96" H.O. type fluorescents is rated at 7500 hours' life—more than 2 years' use in the average installation—and they're designed to operate on present 96" H.O. ballasts.

15,000 LUMENS

in the economical 96-in. (Super-Hi™) type lamp

New ballast equipment and improvements in lamp design have increased the light output of this single 8-foot S.H.O. lamp to 2½ times that of ordinary lamps. Smooth, tubular surface can't accumulate dust and cut down light. Rated at 7500 hours' life.

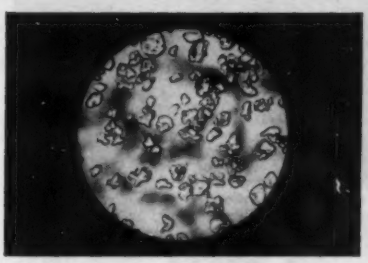
job that two different types have been doing!

LUMENS
(COOL WHITE)

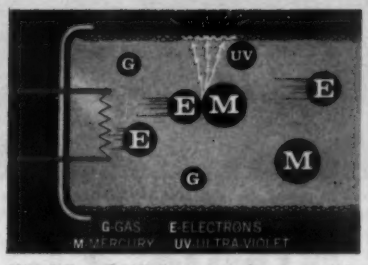
Simplify stocking, ordering and maintenance by specifying this one 40-watt fluorescent lamp for the job that two different types have been doing! The new Westinghouse "Universal" lamp can be used on either your present rapid start or preheat circuits with no loss in lumen output. You'll save storage space; save time and error in maintenance by stocking this one lamp.

Whether you're planning or expanding, you can use this lamp in your new fixtures, as well as in your existing ones. And here's the best news of all: light output has been increased to 2800 lumens, while the list price has been *reduced* to only $1.25—5¢ less than old style rapid start lamps!

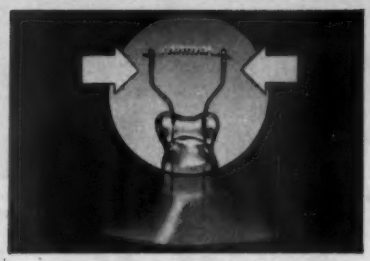
Only Westinghouse brings you these 6 LIGHT-BOOSTING ADVANCES



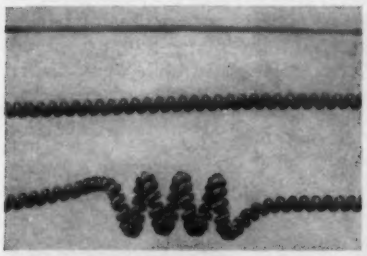
Ultralume™ Phosphors: Westinghouse research has proved that the size of the individual phosphor particles which coat the inside of a fluorescent lamp have a direct effect on the amount of light given off. Now, a new and exclusive Westinghouse process selects the right particle size for more efficient light-producing phosphors.



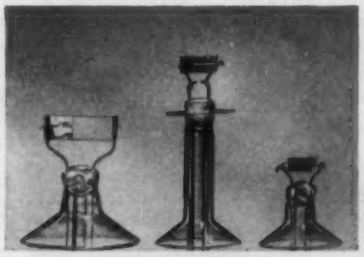
Mixed Gases: All fluorescent lamps contain mercury and gases. The gases serve as conductors until the mercury is vaporized. These gases and mercury vapor then convert electricity into ultra-violet radiation, which causes the phosphors to "fluoresce." Westinghouse uses the right mixture and pressure for each type of fluorescent lamp.



Plated Leads: The electron bombardment inside a fluorescent tube eventually causes particles of the metal supports and leads to sputter off causing "end blackening." To prevent this, Westinghouse plates the lead wires with super-hard chrome-vanadium. Result: tubes that *stay* brighter, end to end.



Triple Coiled Electrodes: Westinghouse uses triple wound electrode coils to hold the right amount of emission material. This carefully measured amount is heated quickly and adequately protected from bombardment to insure long life and trouble-free starting.



"Custom" Anodes: Anodes act as buffers and prevent excessive "sputtering" of emission material from the electrodes. Since the electrical characteristics are different for each type of fluorescent lamp, Westinghouse anodes are especially engineered to fit the electrical requirements of each type of lamp.

Silicone "Raincoats": In high-humidity areas, moisture can collect on the exterior surface of the lamp and prevent it from starting. To protect against moisture accumulation, Westinghouse fluorescents are given a special Silicone coating, or "raincoat," which disperses this film into harmless droplets.

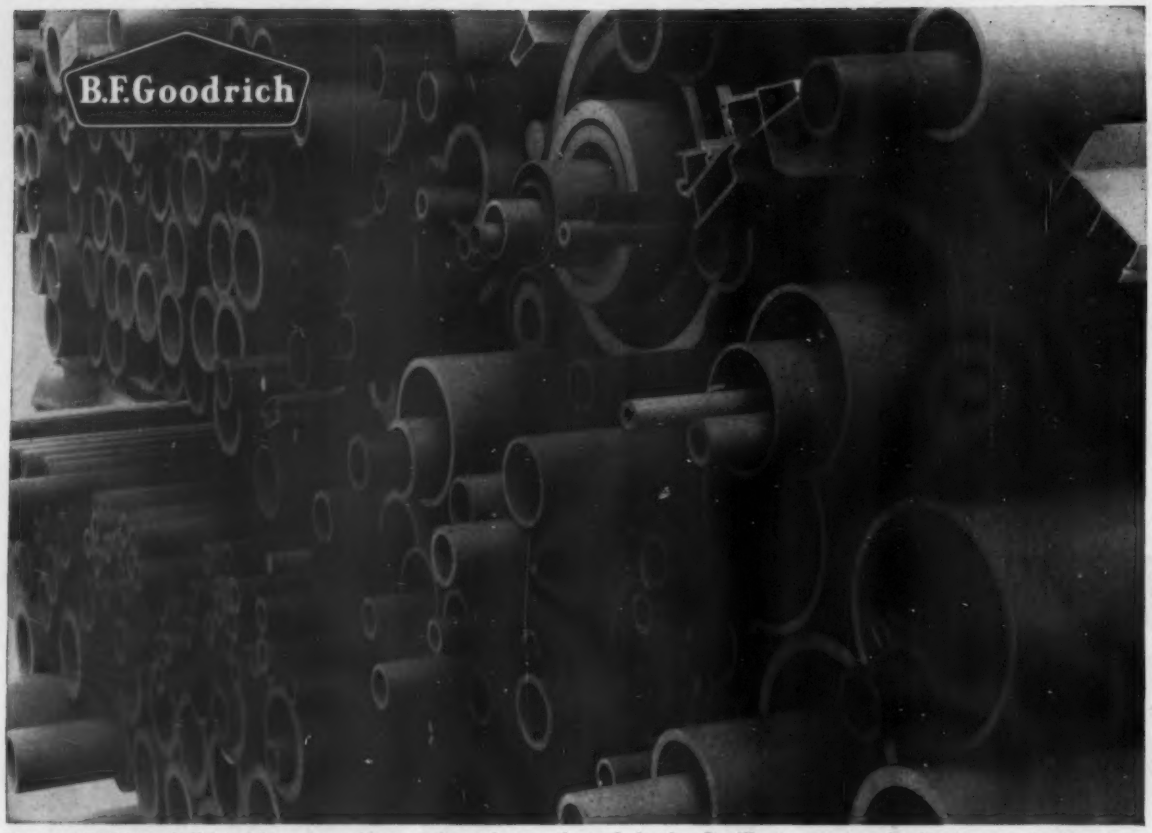
CONTACT YOUR LOCAL WESTINGHOUSE LAMP AGENT, OR WESTINGHOUSE LAMP DIVISION, BLOOMFIELD, N. J.

These new fluorescent advances are made possible by the same Westinghouse Research which brought you . . .

NEW SHAPE . . . NEW LIGHT . . . WESTINGHOUSE EYE SAVING WHITE BULBS . . . *Another reason why—*

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 552 on Reply Card



Koroseal PVC Pipe *is lightweight, resists acids, corrosion, aging, weather and abrasion. It will not support combustion, is an excellent insulator. Fast, easy installation and long life result in substantial cost reductions.*

Specify Koroseal PVC pipe and fittings for long life at low cost

The more severe the service conditions, the more apparent are the superior properties and quality of rigid Koroseal PVC pipe, fittings, valves and sheet. Koroseal PVC is delivering long, trouble-free service in a multitude of industrial applications where corrosion, chemicals, high pressures and physical abuse ruined other types of pipe in a hurry. And savings are substantial—on original cost, installation costs, reduced maintenance and longer life. Investigate the many advantages of Koroseal PVC pipe now. For details, etc., write Dept. PE-9. *B. F. Goodrich Industrial Products Company, Marietta, Ohio.*

Koroseal PVC Fittings *can be joined to Koroseal pipe by solvent-cementing, heat welding, flanging or threading. Recessed threads protect against damage, eliminate cross threading. There's a size and type for every need.*

Koroseal Valves—*excellent for handling fluids, gases and corrosive materials. Complete selection of diaphragm, ball, and check valves for all types of service. Strainers and other piping components also available.*

Sheet, Tubing, Rods—*Koroseal PVC also is available in other forms . . . sheet and fabrication aids for duct work . . . bar stock for machined parts . . . tubing for special uses.*

B.F.Goodrich *Koroseal rigid PVC products*

For more facts circle 553 on Reply Card

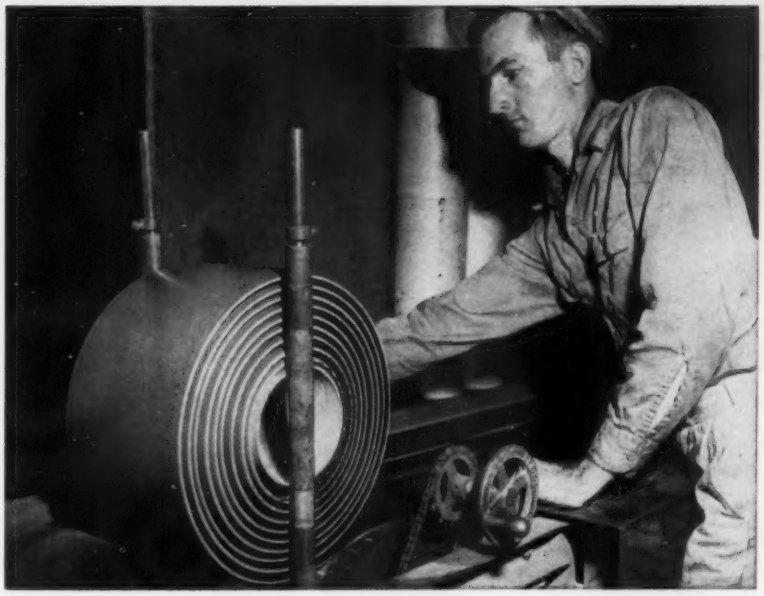
For more facts circle 554 on Reply Card →

first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 30



NO WASTE HERE

Are you looking for a paper or paperboard that's specially treated to handle sticky materials? One that cuts product waste and saves time? This story will give you helpful ideas.

Camelback — the rubber compound used for retreading and recapping tires — is supplied to the retread shop in roll form, wound on a cardboard core. When the retreader gets down to the last few feet of stock (worth almost two dollars) the rubber often sticks to this cardboard core, and can't be pulled loose. If the retreader wants to save the material, he must use a solvent to separate it. Naturally, the solvent makes for a gooey mess.

To eliminate this waste, a leading camelback manufacturer, Better Monkey Grip of Dallas, tried various release coatings. Different types of waxes were applied to the cardboard . . . they didn't work. Next, polyethylene got a try-out, but it proved expensive, difficult to handle, and it tended to dog-ear.

Then they were supplied with a different type of core coating from Textile Paper Products, Crossett, Arkansas. The new coating: Syl-off*, a Dow Corning silicone paper treatment. As a test, a Syl-off coated core was wrapped with camelback and put under pressure for three months. When checked there was still no sign of sticking. And these test conditions by far exceeded actual conditions.

Textile Paper has found that kraft coated with Syl-off costs only two-thirds as much as moderately priced release sheets and only half as much as polyethylene-coated stocks. Ludlow Papers, Inc., Homer, La., supplied the kraft paper.

The Syl-off coated cores have been so successful that Better Monkey Grip has now standardized on them for all tread stock it distributes. *No. 307*

*T.M. DOW CORNING CORPORATION

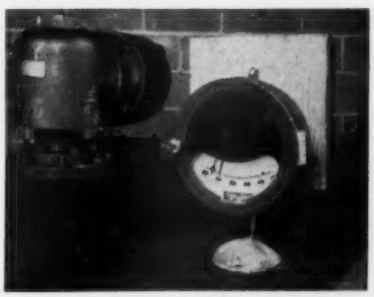
A BETTER GLAND SEAL

When you apply a valve sealant you want it to stay there, seal tightly and keep out harmful contaminants. Here's one that does that — and more.

A large Texas chemical company requires a tight packing seal on the shafts of seven 2-speed mixers in its light hydrocarbon section. Cuprous ammonium acetate and butadiene are combined in these mixers, which operate at 68 or 100 rpm. The environmental combination of chemicals and temperatures from 10 F to 200 F is pretty fierce. It could quickly ruin the effectiveness of many sealing compounds. Yet they've solved the problem. How?

With a nonreactive compound: Dow Corning Valve Seal. Applied only once a month to the asbestos packing in the drive-shaft glands, this silicone sealing material has kept the lines free of contamination ever since it was first applied in 1952. Dow Corning Valve Seal resists temperatures from —40 to 500 F, moisture, oxidation, and oils, in addition to most chemicals. A very versatile product, it lasts a long time and doesn't gum up.

All in all, a sealant worth investigating for your own plant. *No. 308*



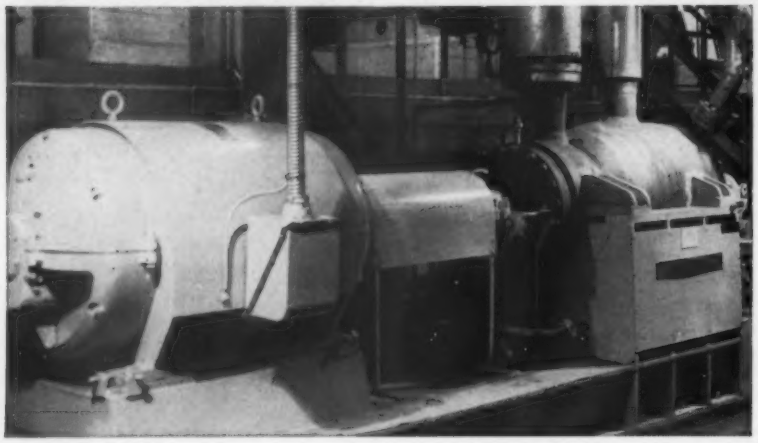
THIS GREASE PAYS OFF

Many lubricants that do a good job at room temperature fail when the heat's on. Here's a story about a grease that doesn't fail . . . withstands 350 F!

Electric Machinery Manufacturing Company of Minneapolis stores its supply of coating asphalt in tanks. To be sure the asphalt remains in a liquid (*Cont. pg. 2*)

FOR DATA RELATING TO THESE ARTICLES, CIRCLE REFERENCE NUMBER IN COUPON ON NEXT PAGE

MORE



CUTS MOTOR COST 38%

When surroundings are humid, dusty, or in other ways contaminated, motors need protection. Formerly, total enclosure was the answer. But now there's a new kind of built-in protection available, based on new insulating materials. Here's how this open-skies protection worked for one company.

Minnesota and Ontario Paper Company was building a new plant at International Falls, Minn. The power house needed two 900-hp boiler-feed pump motors, a 600-hp induced-draft fan motor, and a 300-hp forced-draft fan drive motor. Because of the expected high moisture and dust content of the powerhouse air, plant planners originally specified totally-enclosed fan-cooled motors. However, because of the extra cost of TEFC equipment, they sought ways to avoid the enclosures. Was there a more economical answer?

Yes! Electric Machinery and Manufacturing Company recommended motors with Sil-Clad insulation. The Sil-Clad system, based on Silastic®, the Dow Corning silicone rubber, is virtually self-protecting. It has great resistance to heat, moisture, and airborne contaminants such as dust, salt spray, or chemicals.

Plant engineers took the advice and installed open, drip-proof motors with Sil-Clad insulation. By so doing, they saved $28,000 on the original cost estimate for TEFC equipment. That's 38% of the expected total! And, as an added bonus, the Sil-Clad motors provide a greater service factor (overload capacity) because of the increased thermal stability of silicone insulation . . . an important margin of dependability in any plant.

Next time you're considering a TEFC motor, ask about silicones first. *No. 309*

GREASE *(Continued)*

state, the tanks are kept under constant agitation and heated to 350 F. But this heat melted the organic grease in the agitator's reduction gearbox on the top of the tank. Unless the gears were cleaned and regreased every few weeks, the grease ran down inside the tanks and contaminated the asphalt. The problem needed a quick solution and they found it . . . in a silicone lubricant . . . Dow Corning 44 Grease.

This lubricant has excellent heat stability . . . won't run off or oxidize even at 400 F. It did the job so thoroughly for Electric Machinery engineers that they check the gearbox but once a year now. A saving of several hundred dollars in material and labor costs has been realized, and contamination ended, thanks to silicone grease.

If your plant has a similar lubricating problem, take a look at some of Dow Corning's silicone greases. *No. 310*

new literature and technical data on silicones

Metal Castings Release Easier, faster, when Dow Corning Silicones are used as release agents. Silicone parting agents reduce clean-up time because little or no build-up develops . . . they're quick spreading because of their extremely low surface tension . . . long lasting because they're heat stable . . . and they produce sharper detail, give the moldings a superior surface. Silicone release agents for several molding and casting methods are reviewed in a three-page data sheet. *No. 311*

If You Can't Stop the Heat you can service equipment to give continuous, reliable performance in spite of it. Dow Corning 41 Grease gives lasting lubrication from zero to 450 F in ball bearings on such diversified high temperature equipment as oven conveyors, flat-glass drawing machines, continuous welders, can-soldering rolls, and vulcanizer car wheels exposed to humidity and even steam. Typical properties of 41 Grease and specific examples of actual applications are contained in a 4-page brochure. *No. 312*

Fix For Good—Whenever temperature extremes are a problem, rubber parts or components give longer, maintenance-free service if they're made with Silastic, the Dow Corning silicone rubber. Acclaimed for their resistance to weathering, ozone, chemicals, moisture and steam, replacement parts made from Silastic help eliminate downtime and cut general maintenance costs. *No. 313*

Wherever Dissimilar Metals are in contact, a new silicone compound will help prevent galvanic corrosion. In addition, this compound offers the excellent thermal stability and moisture repellency normally associated with silicones. A concise data sheet describes the performance of this new product. *No. 314*

Cut Power Outages — Insulator flashover and power leakage are problems common to power installations in areas where industrial dirt and dust are prevalent. Power outages, flashovers, insulator cleaning and line maintenance problems have been drastically reduced by Alpena Power Company through the use of a Dow Corning silicone compound. The story of their contamination and cleaning problem and how it has been virtually eliminated is told in a reprint from POWER ENGINEERING. *No. 315*

Dow Corning Corporation, Dept. 9621, Midland, Michigan
Please send me: 307 308 309 310 311 312 313 314 315

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COMPANY _____
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SILICONE NEWS is published for production and maintenance men by

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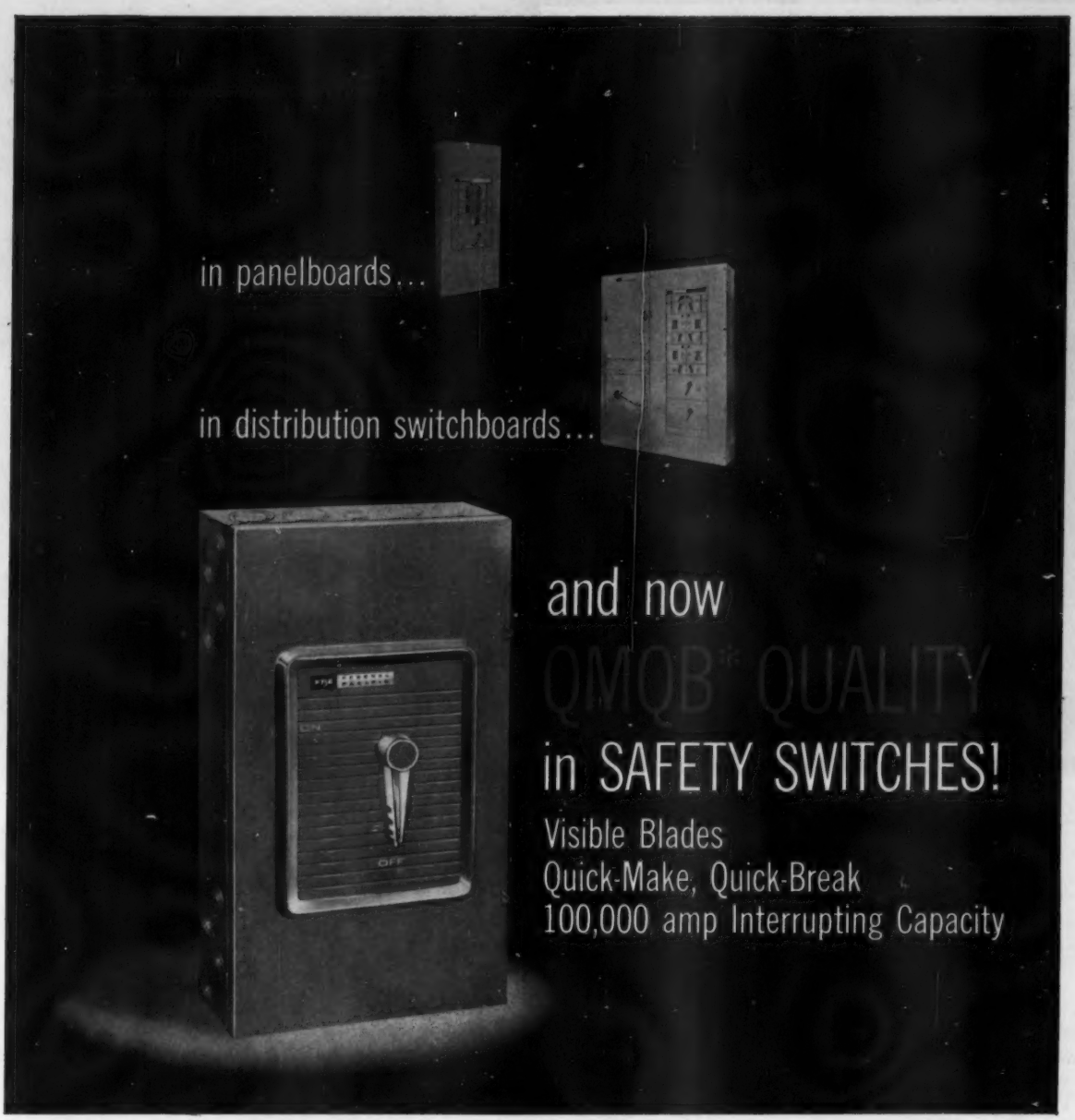

✻ QUICK-MAKE, QUICK-BREAK ACTION—QMQB Safety Switches are tease-proof! Once handle passes midpoint, QMQB mechanism takes over—drives contacts home quickly and accurately in less than one cycle. Longer contact life...cleaner contacts...positive connections...cooler, more reliable performance.

■ 400 amp THROUGH 1200 amp—Normally assembled to take single fuses on 400 amp and 600 amp ratings...parallel 400 amp fuses on 800 amp switch...parallel 600 amp fuses on 1200 amp switches. Available soon —800 amp and 1200 amp ratings designed for single fusing.

■ VISIBLE BLADES FOR MAXIMUM SAFETY—Eliminates any doubt as to whether switch is "ON" or "OFF" and provides for easy inspection.

■ LEVER-TYPE HANDLE ACTION FOR EASY SWITCH OPERATION—Requires less than 60° throw to operate interlock and switch mechanism. For added safety: large, rugged handle indicates switch position...can be clearly seen from a distance.

■ DEIONIZING ARC QUENCHERS FOR COOLER, FASTER INTERRUPTION—Arc is drawn from contact...broken into segments by grids...cooled and extinguished before any damage can be done.

■ HIGH PRESSURE FUSE CLIPS FOR LONG LIFE, DEPENDABLE SERVICE —Belleville washers apply constant pressure against the fuse and hold it in a vise-like grip. Low resistance contact...cooler, more efficient operation.

Now...by applying its proven QMQB concept to heavy duty safety switches ...Federal Pacific makes a major advance in the economical handling of Industry's increased power requirements. For complete details of QMQB Safety Switches write for Bulletin #1280, Federal Pacific Electric Company, General Offices: Dept. 371, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

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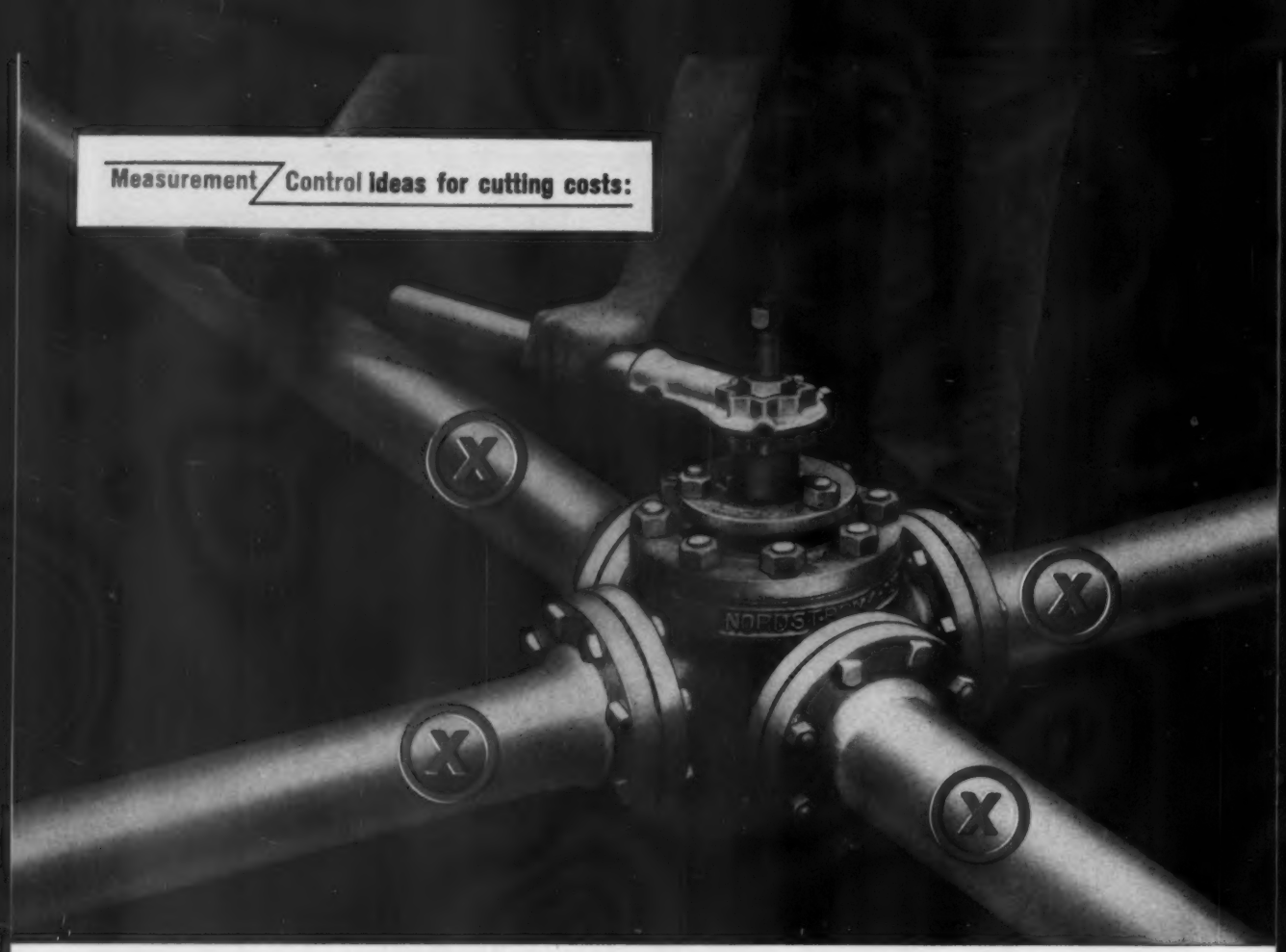

(X) MARKS THE SPOTS
where 4 valves are replaced by 1...

. . . And that one valve is a Rockwell-Nordstrom Multiport lubricated plug valve. Above, it is controlling flow in *four* directions—a multiple job only this type of valve can do.

This could mean big savings in your plant, plus more efficient traffic control of everything you flow through pipe. For instance: A large sugar refinery had trouble efficiently routing slurry to process units. A Rockwell field engineer recommended Multiport valves, since *one* Multiport does the work of *three* or *four* ordinary valves. With fewer valves and simplified piping and fittings, the new installation quickly paid for itself by eliminating costly flow control errors and improving quality. And since Rockwell-Nordstrom is the most *complete* line of lubricated plug valves, the Rockwell field engineer was able to make a number of other valve suggestions for improving flow control, preventing waste, and reducing valve maintenance.

There are literally hundreds of ways Rockwell field engineers are helping manufacturing and processing plants save time, money, and materials through better measurement and control methods. The experience of the world's largest manufacturer of valves, meters, regulators, and other measurement and control products, can pay off for you, too. Wherever gases or liquids flow through pipe in your plant, there is a real opportunity for savings. It will cost you nothing to get the facts. Simply send the coupon.

ROCKWELL

The leading single source for Measurement / Control products and ideas

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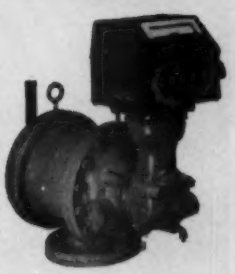
"IN-PLANT" METERING:

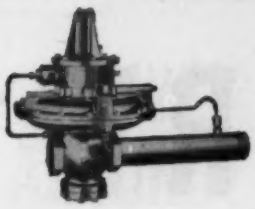
LIQUIDS AND GASES

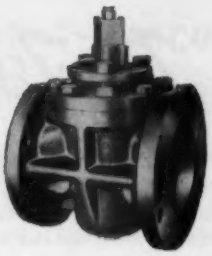


Rockwell gas and liquid meters, properly applied, can improve quality control, sharpen cost control, and prevent waste in almost every plant department. A Rockwell Field Engineer can help you find *where* meters will cut costs . . . and Rockwell has a complete line of meters to measure practically anything that will flow through pipe.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





More efficient control of all the material flowing through pipes in your plant is a positive step in cutting costs. There are new applications and new ideas for using gas pressure regulators and valves that will stop wasteful, inefficient, and dangerous handling of fuels, production fluids, and products. A Rockwell Field Engineer can show you *where* and *how*.

HOW MUCH COULD YOU SAVE?

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. It will cost you nothing to have a Rockwell Field Engineer *show* you. Simply send the coupon below, now.

SEND COUPON NOW!

MEASUREMENT & CONTROL DEVICES

another fine product by

ROCKWELL

Rockwell Manufacturing Company, Pittsburgh 8 Pa. Dept. MCZJ

☐ Please have a Rockwell Field Engineer call me for an appointment.

Please send literature on ☐ Controlling gas pressures; ☐ Valving gases, liquids and slurries; ☐ Measuring liquids; ☐ Measuring gases.

I am concerned primarily with ☐ Light & Heavy Metal Fabricating ☐ Basic Chemical Production ☐ Chemical Processing ☐ Food, Drugs & Tobacco ☐ General Manufacturing Operations ☐ Petroleum Processing

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Name: _____ Title: _____

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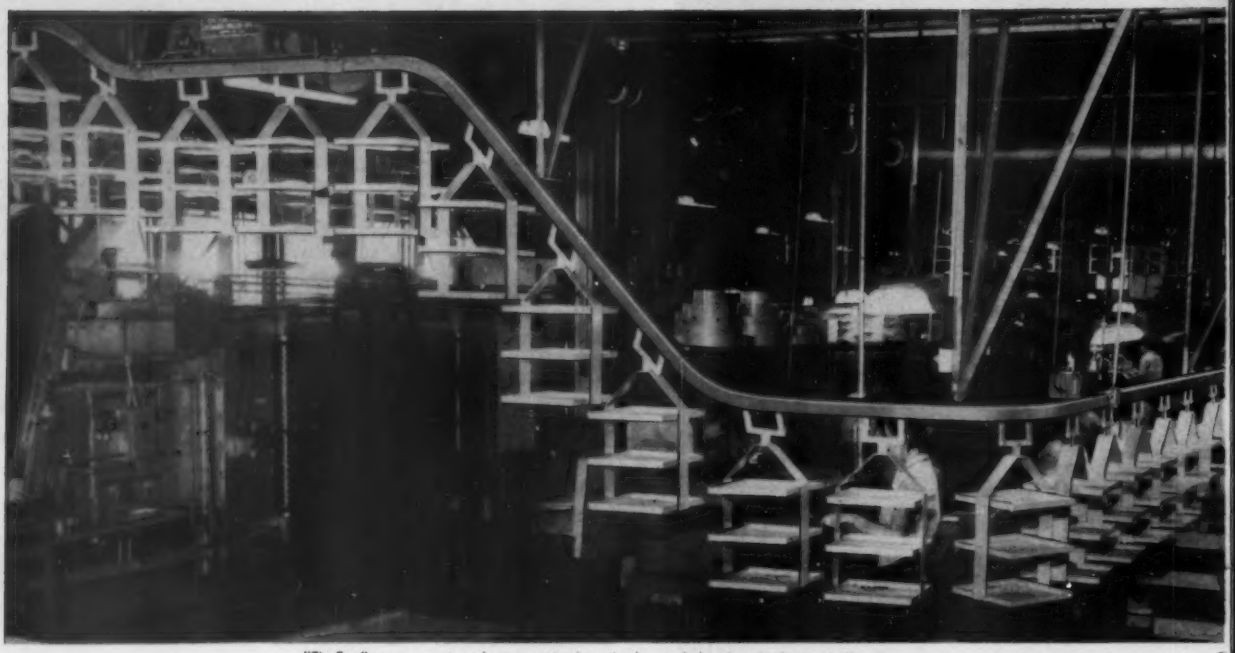
City: _____ Zone: _____ State: _____



"Zig-Zag" conveys parts and components where they're needed—when they're needed!

R-W "Zig-Zag"® CONVEYORS

"Zig-Zag"® FEATURES...

- **FLEXIBLE**... may be installed to go *up* to storage areas—*down* to production stations—*in, out* and *around* pillars, doors, machinery, etc. R-W "Zig-Zag" Conveyors carry unit loads up to 125 lbs. at speeds ranging from one inch to, if required, 100 feet per minute.

  The only conveyor of its type with a *proven multi-speed drive*... permits expansion at any later date. "Zig-Zag" is equally adaptable for installations of all sizes—no matter how large or how small.

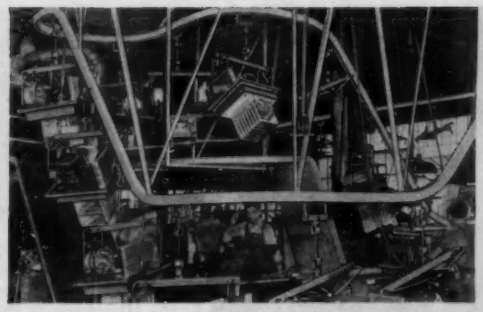
- **STRONG**... a continuous chain of alternate horizontal and vertical wheels travels through a rugged steel track much like water flows through a pipe. All moving parts of the chain are fully enclosed and protected from dust, dirt, etc. Chain, track, power units and accessory equipment are all designed to provide years of dependable, trouble-free service.

- **ECONOMICAL** to purchase, install and operate. Completely re-usable in case of plant changes... may be relocated, changed or expanded to meet plant alterations or expansion. One large system can be later changed to make two smaller ones or vice-versa.

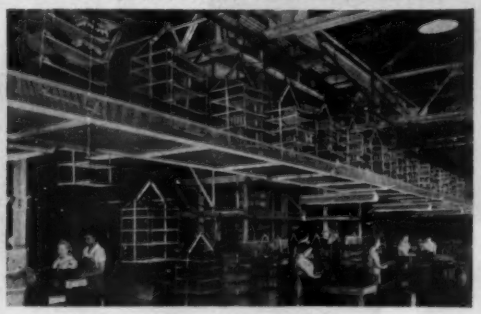
- **EFFICIENT**... R-W "Zig-Zag" is the *original* conveyor of its capacity in this field—available in one, top-quality grade—inferior components are never offered as a substitution. Designed, manufactured and backed by Richards-Wilcox, a leading firm in the overhead materials handling field for over *75* years.

REDUCE COSTS IN EVERY MANUFACTURING AND WAREHOUSE OPERATION

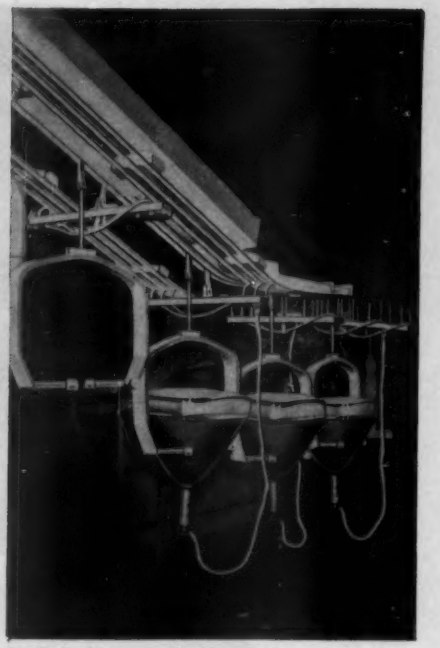
R-W "Zig-Zag" Conveyors will help you cut costs throughout the entire plant... providing a cost-reduction that could increase your annual profit as much as would a hard to achieve 50% increase in sales. "Zig-Zag" conveyors will reduce costs on an over-all basis by efficiently utilizing overhead space to provide a steady flow of parts and components... they help to make individual work stations more efficient and provide a visually apparent inventory storage in the "free" area under the building trusses. "Zig-Zag" Conveyors safely carry products through all production processes with increased speed and lower operating costs. Automatic devices of all types can be included in a "Zig-Zag" System to provide "machine-muscle" for the raising, lowering, moving and transferring of materials, components and products.



Flexible..."Zig-Zag" conveyors go exactly where you want them!



Provides part and component inventory in "free" overhead area!



"Zig-Zag" safely conveys TV tubes and similar products—reduces product breakage loss!

...PROFITABLY AND EFFICIENTLY CONVEY PRODUCTS UP-DOWN-IN-OUT and AROUND!

"ZIG-ZAG" to "TWIN-TRAK"... from automatic conveying to complete automation in the handling of materials

"Zig-Zag" components provide the backbone of R-W "TWIN-TRAK" Overhead Automatic Dispatch Systems... the ultimate in automated conveying of materials, components and products. R-W "TWIN-TRAK" Systems consist of one or more power tracks and as many storage or free tracks as desired, plus the necessary switches, carriers, automatic controls and power equipment. They not only move products from one point to another, but automatically and economically convey components to predetermined work stations from overhead storage or inventory banks. This unique system not only improves materials handling, but, because of its great versatility, permits the coordinated use of special new production techniques and machinery to produce products faster and more economically.

ON-THE-SPOT ENGINEERING SERVICE

Your local R-W Sales-Engineer is a factory trained materials handling specialist. He stands ready and willing to illustrate how an efficient R-W Overhead Conveying system will help you realize maximum production efficiency and economy. Whether you are planning a new plant or expanding present facilities, it will be to your advantage to let an R-W Sales-Engineer survey your problem and submit a recommended solution.

WRITE FOR ANY OF THE FOLLOWING CATALOGS

- R-W "Zig-Zag" Continuous Powered Conveyor, Catalog No. A-93R
- R-W "TWIN-TRAK" Overhead Automatic Dispatch Systems, Catalog No. F-192
- R-W "TRU-TRED" Monorail Systems, Catalog No. A-64
- R-W "SAFE-RAIL" Conveyor Equipment, Catalog No. A-94R
- R-W "458" Chain Conveyor Systems, Catalog No. A-570

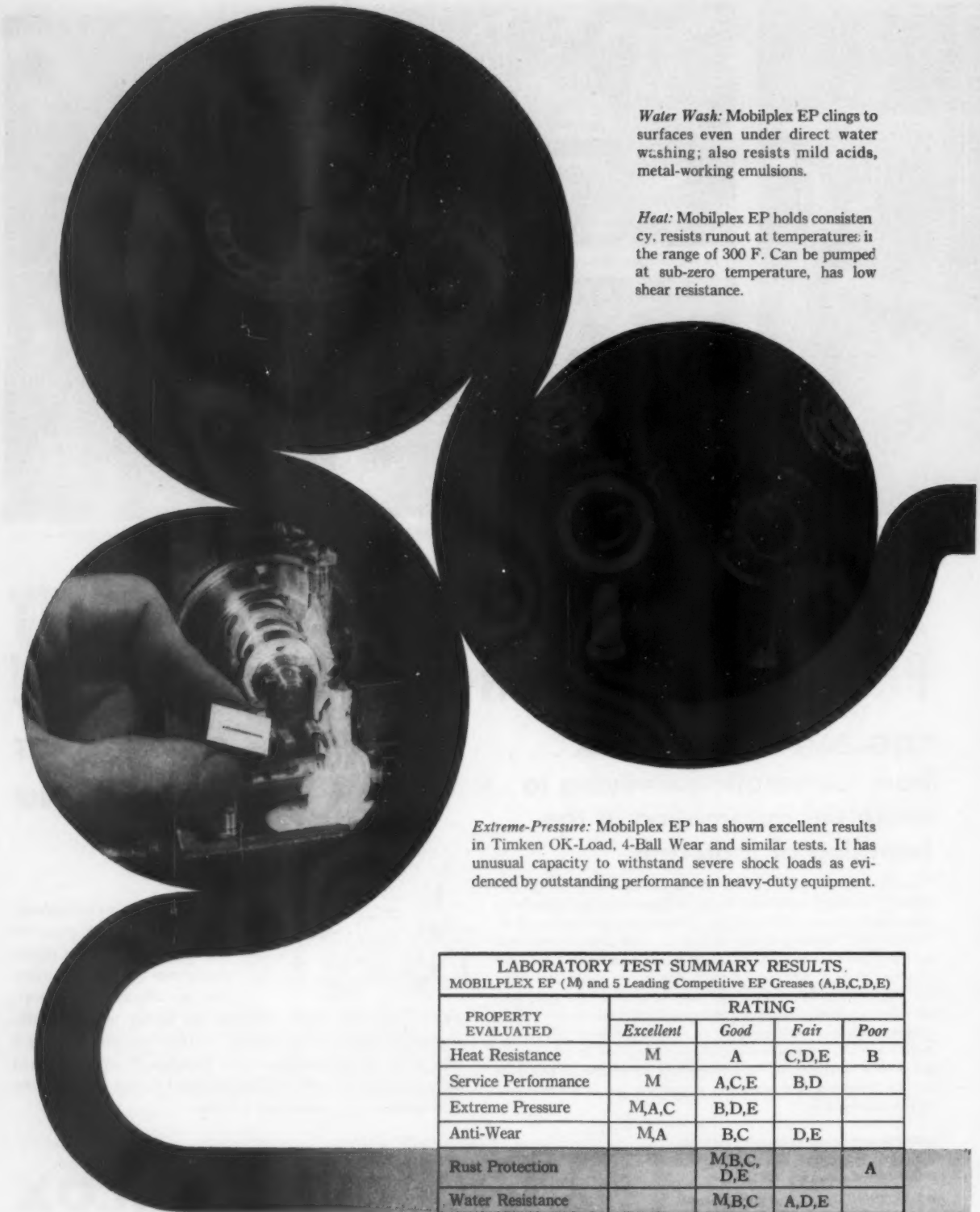
Richards-Wilcox

MANUFACTURING COMPANY

"MATERIAL HANDLING DIVISION"

460 W. THIRD STREET • AURORA, ILLINOIS

For more facts circle 557 on Reply Card



Water Wash: Mobilplex EP clings to surfaces even under direct water washing; also resists mild acids, metal-working emulsions.

Heat: Mobilplex EP holds consistency, resists runout at temperatures in the range of 300 F. Can be pumped at sub-zero temperature, has low shear resistance.

Extreme-Pressure: Mobilplex EP has shown excellent results in Timken OK-Load, 4-Ball Wear and similar tests. It has unusual capacity to withstand severe shock loads as evidenced by outstanding performance in heavy-duty equipment.

LABORATORY TEST SUMMARY RESULTS
MOBILPLEX EP (M) and 5 Leading Competitive EP Greases (A,B,C,D,E)

PROPERTY EVALUATED	RATING			
	Excellent	*Good*	*Fair*	*Poor*
Heat Resistance	M	A	C,D,E	B
Service Performance	M	A,C,E	B,D	
Extreme Pressure	M,A,C	B,D,E		
Anti-Wear	M,A	B,C	D,E	
Rust Protection		M,B,C, D,E		A
Water Resistance		M,B,C	A,D,E	
Handling Properties		M,A,B C,D,E		
Controlled Bleeding		M,A,C	B,D,E	
Non-staining		M	A,B, D,E	C

announcing Mobilplex ep

The Multi-Service Grease with unique Calcium EP Complex. Never before in a single lubricant such a wide range of use . . . such a margin of superiority . . . such a potential for maintenance savings!*

From Mobil research comes Mobilplex EP . . . a Multi-*Service* extreme-pressure grease far superior in quality and range of applications to any multi-*purpose* grease available.

The unique Calcium EP Complex, special additives and extremely tenacious nature of Mobilplex EP, provide maximum protection against wear, rust, washout and heat. Because of its greater versatility, Mobilplex EP goes further than competitive extreme-pressure greases in simplifying your lubricant application, storage and purchasing problems. This new-type lubricant has given industrial machines greater protection while replacing as many as seven other greases. Mobilplex EP has all of the advantages usually associated with EP greases—as well as excellent storage, structural and oxidation stability.

Examination of the laboratory summary at left shows that in comparison with five leading extreme-pressure lubricants Mobilplex EP is the *only* grease excellent or good in every grease quality tested. No wonder aluminum and steel plants, forging and metal-drawing shops, the cement, chemical and rubber industries, steel and paper mills are reporting dramatic success with Mobilplex EP.

For full details contact your Mobil representative.

Mobil

**Multi-Service means ideal for all types of anti-friction and plain bearings under all normal operating conditions (temperatures in the range of 300 F.) and for all types of dispensing equipment.*

Proved Petroleum Products . . . Available with a Mobil Program of Correct Lubrication

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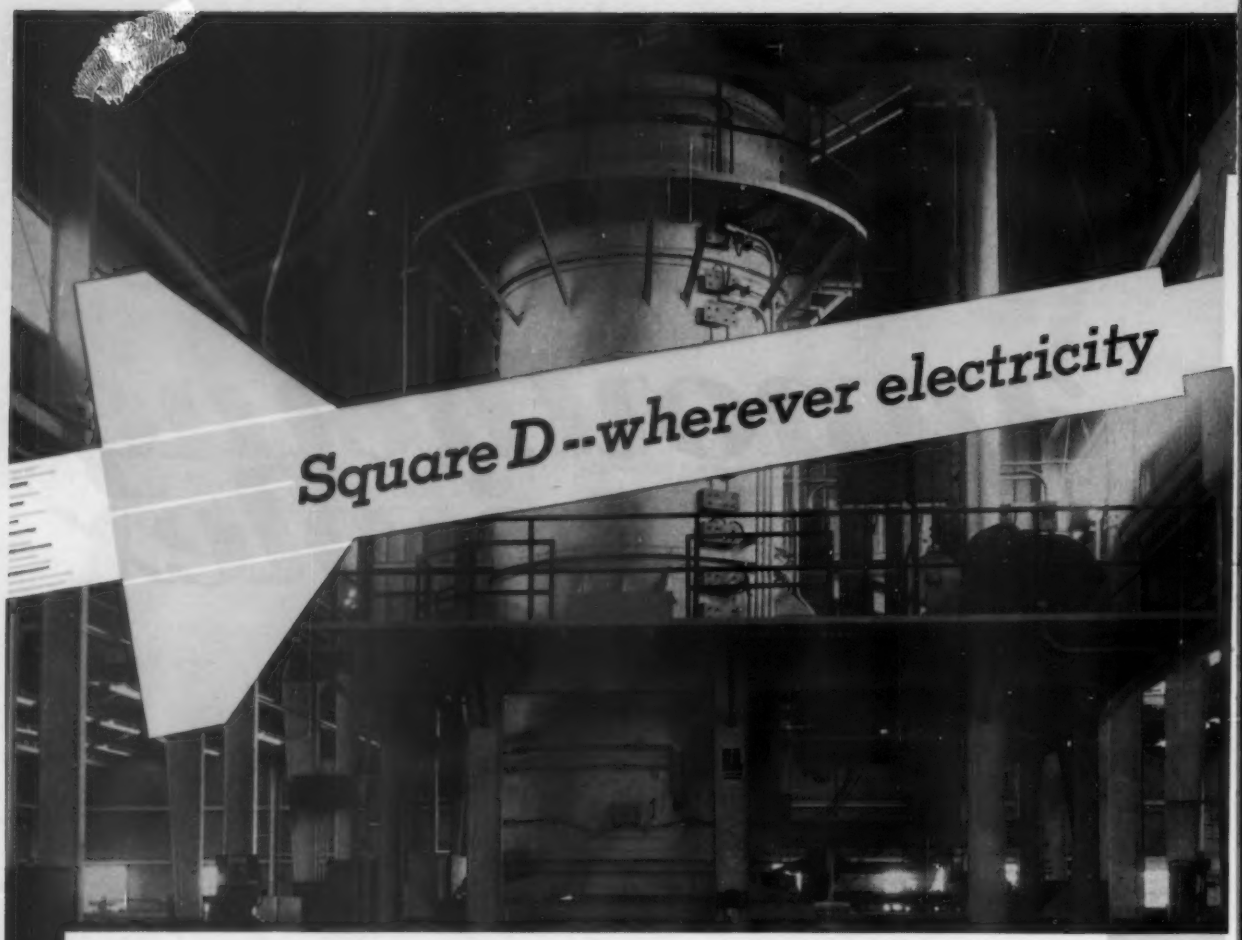


Largest Hardening Furnace of Its Kind in the World!

This Gantry-type Lindberg furnace, built for the Goodyear Aircraft Corporation of Akron, is the world's largest vertical, controlled-atmosphere, drop-bottom hardening furnace. *It towers 24 feet high and is capable of heat-treating rocket cases more than five feet in diameter, 20 feet long and weighing as much as 5,000 pounds!* The furnace pit is 18 feet wide, 53 feet long and 25 feet deep. The furnace spans the entire width of the pit and can be moved, under power, from one end to the other, permitting loading or unloading at any of the pit stations.

Square D control puts this giant through its precise paces!

★ ★ ★

FIELD ENGINEERING SERVICE is available through more than one hundred Square D offices, backed by an international network of over 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

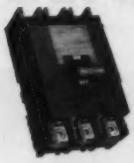
Executive Offices • 6060 Rivard Street, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

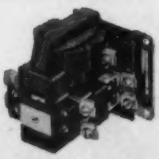
SQUARE D COMPANY ★ ★

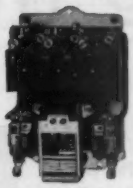
is distributed and controlled

HERE ARE THE KINDS OF SQUARE D PRODUCTS WHICH LINDBERG USES TO CONTROL ITS FURNACES


circuit breakers

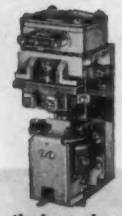
contactors

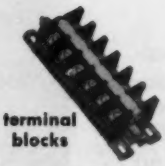

machine tool relays


starters

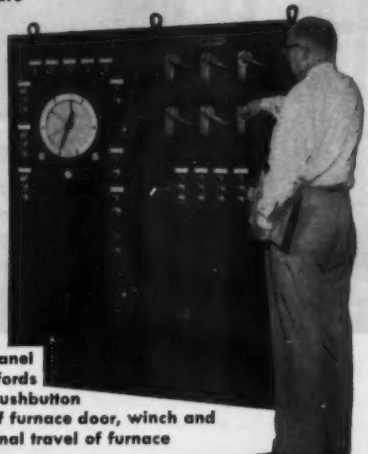
combination starters

reduced voltage starters


timing relays


terminal blocks

limit switches


typical panel which affords remote pushbutton control of furnace door, winch and longitudinal travel of furnace

pushbuttons

safety switches

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ADJUSTABLE SPEED DRIVES
BUSWAYS & WIREWAYS
CIRCUIT BREAKERS
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PUSHBUTTONS
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STAGE DIMMERBOARDS
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TERMINAL BLOCKS
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this booklet shows you how to cut costs

in sealing duct insulation

In this new booklet, you'll see how to make a quick, lasting airtight seam or joint on duct insulation. Here are full facts on Dutch Brand No. 353 Silver-backed Cloth Tape. It shows how to save time and cuts costs on duct forming, sealing, and holding operations in air conditioning, heating, and ventilating work. Application is quick and easy—just press it into place, the pressure-sensitive adhesive grips and holds immediately, making a lasting seam, even on high-pressure systems. The tape is waterproof and wear-resistant . . . silver color for neat appearance. *Johns-Manville Dutch Brand Division, 7800 South Woodlawn Avenue, Chicago 19, Illinois.*

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JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE

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COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Trade Secrets

DRAWINGS AND blueprints were sent by a steel car manufacturer to its customers for assistance in the preparation of orders for repair parts as well as new equipment.

Discovering that these plans and blueprints had been taken from these customers by a competitor who had appropriated them to its own use, the car manufacturer sued for an injunction against the use of the plans by others than those to whom they had been entrusted.

In sustaining an injunction granted by the lower court, the Supreme Court of Pennsylvania said: "At common law, the author of a manuscript might obtain redress against one who had surreptitiously got possession of it. An inventor does not lose his rights unless he suffers his invention to go into public use without objection. The exclusive right of one to make reproductions of a picture does not justify another to make and sell photographs.

"So the exhibition of a blueprint of machinery in a frame in the office of a purchaser, although done by permission of the manufacturer, a copy of whose drawing it is, certainly is not a general publication and the abandonment of exclusive rights in the drawing. When this manufacturer permitted its customers to have blueprints it did not give them the right to a use which would give an unfair advantage to a competitor." Court brief 60 Atl. 4, Pennsylvania, 1904.

Sales Taxes

AN OHIO manufacturer of safes and bank vaults made a contract for the sale of equipment to California banks. In the contracts it was provided that the purchaser agreed to buy and the manufacturer to furnish, and in some instances, to furnish and install the described equipment.

For the material and work, the purchaser agreed to pay 25 per cent 30 days from the date of the contact, 25 per cent 60 days from that date, 25 per cent when the material was shipped and 25 per cent upon completion of the contract. In addition, there was the provision, "All materials shall remain the property of said manufacturer until fully paid for."

Suit was brought later by this manufacturer to recover the sales taxes imposed on these transactions by the state. From an adverse decision, the manufacturer appealed. In sustaining the judgment against the manufacturer and denying it the right to a refund of these taxes the California court said: "While these safes and vaults had been sold to California banks under the agreement that the purchasers would make three advance payments with the final payment due on delivery, with the further provision that title to the property remained in the manufacturer until payment was fully made, the title to the goods passed to the purchasers in California and the sales were subject to the California sales tax." Court brief 336 Pac. 2d 650, California.

Ordinance Invalid

BY AN ORDINANCE of Culver City, California, it was forbidden to commence or carry on any of the businesses specified in that ordinance without first having paid the required license fee and procuring a license.

The license fee was $50 a year or part of a year from a local, and $100 a year from an itinerant electrician or electrical contractor. The amount of this license fee, however, was made a debt due to the city and a violation of any provision of the ordinance, including the payment of this fee, was a misdemeanor.

Payment of this fee was refused by an electrical contractor on the ground that the license issued to him by the state authorized him to do electrical contracting work in the city and that such an ordinance constituted imprisonment for debt in violation of the constitution.

The Supreme Court of that state said of this licensing ordinance that it was invalid and unenforceable against this electrical contractor insofar as it provides for the enforcement of the ordinance by criminal process. Court brief 334 Pac. 2d 571, California, February 2, 1959.

Information of Contents

A FIRM ENGAGED in the rerefining of previously used lubricating oil was ordered by the Federal Trade Commission to cease and desist from representing that this oil which it markets is processed from other than previously used oil.

Oil that was the subject of this order was principally crankcase drainings collected at gasoline stations and packaged in tin cans of the same general size, appearance and kind as those employed in packaging lubricating oil produced from virgin crude.

In its decision, the court said: "The public is entitled to know the facts with respect to the lubricating oil sold by this firm, being produced by previously used oil, and then make its own choice with respect to purchasing such oil or oil produced from virgin crude, even though the choice is predicated at least in part, upon ill-founded sentiment, belief or caprice.

"And therefore the practice of this firm in marketing this rerefined lubricating oil in containers indistinguishable from those used generally in marketing lubricating oil refined from virgin crude, without any disclosure that it is made from previously used oil, constitutes a deceptive practice within the intent and meaning of the Federal Trade Commission Act." Court brief C.C.H., 1959 Trade Cases 69,322. March 19, 1959.

Rental of Power Equipment

CONTRACT FOR the rental of a power unit provided in part: "The party of the first part agrees to rent to the party of the second part the U.D. 24 power unit, rental to commence the day the equipment is picked up and to end on the day the equipment is returned. The party of the second part agrees to return the equipment in sound operating condition."

The equipment was used for eight months. For that period payment was made in full. However, at the end of that time the unit was not returned. When it was returned six months later, the expense incurred by the owner for repairs was $961.62.

From a judgment in favor of the owner for this additional six months detention of the unit and the repair expense, the lessee appealed. The $600 representing the additional six months in which the unit was detained, was disallowed by the appellate court from the total amount recoverable.

As authority for this deduction, the court referred to an earlier decision rendered by a Federal court in a similar controversy. The court held: "The damages for the mere enforced detention of rented equipment after termination of the use thereof is not

COURT DECISIONS

ordinarily held measurable by the provisions in an independent covenant for the stipulated monthly rental of the equipment in the absence of any substantial use of this equipment during the period of the unauthorized detention, for the reason that such rental very generally contemplated and includes a substantial allowance for the depreciation or wear and tear, to which the equipment would not be subjected after the cessation of the use of such equipment." Court brief 333 Pac. 2d 1004, Idaho, December 16, 1958.

Nuisance Charged

WHEN RESIDENTS nearby a mill in Red Bluff, California, asked the courts of that state to prohibit the operation of the mill on the ground that the noise and dust was a nuisance, the court refused.

"There was," said the court, "some noise and dust from the plant but not sufficient to interfere with the rest or peace of mind of persons of normal health.

"It is true," it added, "that there are numerous residents in the vicinity of this plant but it is equally true that both the plant and these residents are adjacent to the railroad and that the area is, to a large extent, used for commercial and business purposes and has been so used for many years.

"Contiguous property owners must to a reasonable degree, yield their desired privacy to the general welfare which is contributed to by the operation of legitimate business.

"Were it not so, railroads could not operate near residences and plants could not be established without the necessity of purchasing prohibitively large areas of property. That reasonable inconvenience must be suffered by owners whose holdings are contiguous to commercial enterprises is too well decided to require a reference to authorities." Court brief 334 Pac. 2d 156, California, January 15, 1959.

Antitrust Suit Dismissed

SUIT BROUGHT by a purchaser of steel products charged that a steel company had been engaged for many years in a program of expansion which had been accomplished by the acquisition of the entire or partial control of other companies.

By so doing, it was further charged, that company had eliminated competition and its competitors can no longer obtain iron ore, coal or limestone from these companies it has acquired.

"As a result of the acquisitions," it was asserted "which have substantially lessened competition, or have tended to create a monopoly, this manufacturer and purchaser and user of steel products has suffered and is now suffering and will continue to suffer damage."

In its dismissal of the action the United States District Court said, "Individual damage, aside from any injury to the public as a whole, is the essence of a private suit under the antitrust laws. The remedy given to private persons is only for one who has been 'injured in his business or property by reason of a violation of the antitrust laws.' Further the alleged violations must be the direct and proximate cause of the injury.

"The complaint here totally fails to allege anything from which it could be deduced that anything defendants have done has injured the plaintiff. The most that can be said of it is that it describes a situation which may affect the economy of the nation as a whole. The plaintiff has no power to correct this under the antitrust laws. As this court remarked in another case, that is the function of the Attorney General.

"The most he offers is a vague feeling that things would be better if there were more small steel companies operating. Whether or not this is true as a tenet of philosophy or economics, it does not absolve the plaintiff from the necessity of proving direct damage to him." Court brief C.C.H.,1959 Trade Cases 69,327, March 31, 1959.

Patent Infringement

A PATENTED device, using the ultrasonic method in the detection of flaws in metal parts, was involved in a recent suit in Ohio.

Its operation, described in part by that court, is, "By this method ultrasonic sound waves having a higher frequency than that audible to the human ear and capable of penetrating solid, liquid or gaseous material are propagated into a metal part. The waves travel through the part at a known speed of propagation characteristic of the material of the part under inspection.

"When the waves reach the opposite end of the part or when they encounter its discontinuities or flaws therein, their echoes are reflected back to the face of the part."

Infringement of the patent was claimed. Defense set up that in licensing this device to railroads the patent owner had restricted its use to the inspection of rolling stock. That by such restrictions, it was contended, the owner had misused its patent monopoly and thereby forfeited its right to the protection of the patent law.

In its refusal to adopt this argument, the court quoted from a decision of the United States Supreme Court:

"The owner of a patent may lawfully restrict his license to the manufacture and sale of patented inventions for use in only one or more of several distinct fields in which it is useful, excluding him from the others." Court brief 1959 Trade Cases 69,239.

Noncompeting Purchasers

UNDER THE United States antitrust laws, discrimination in price is forbidden where such discrimination may lessen or prevent competition with one who either grants or receives such benefits, or with the customers of either.

Violations of these laws were charged recently in an action by a retail gasoline service station proprietor against an oil refining company. Sales, it was asserted by this service station operator, had been made by the refiner to direct-buying consumers at prices lower than those which were charged for the gasoline sold to the owner of these service stations.

In denying a recovery by the operator of the service stations, the court pointed out that the consumers to whom these sales had been made at a lower price were large commercial or industrial users who did not buy gasoline for resale.

"Admittedly," said the court, "these consumers who are alleged to have bought gasoline at a lower price are not in competition with the retail gasoline station owner. If this station operator cannot successfully compete with the oil refiner for these customers when there is no price differential, it is not harmed by any further reduction which the refiner may make in the price it charges to these noncompeting customers.

"Refiner is under no obligation to sell to this retailer at a lower price than it charges to consumers who buy directly from it, in order to enable the retailer to compete with it for the business of these customers. But unless it does this the retailer will never be able to compete successfully with the refiner, at least with respect to price." Court brief C.C.H., 1959 Trade Cases 69,315, March 17, 1959.

For more facts circle 561 on Reply Card ——→

***FULL VALUE* FOR YOUR TRANSFORMER DOLLAR**

New G-E dry-type transformers 8 db quieter, up to 14% lighter

Quieter than ever; 14% lighter; built to last longer. That's the story of the all-new General Electric open dry-type transformers, completely redesigned to meet modern commercial and industrial requirements.

New sound levels are 8 db below published standards and G.E.'s new inorganic Alpholite insulation will not deteriorate with time or temperature—provides exceptionally long life for dry-type units. Aluminum conductors reduce transformer weight, simplifying mounting on balconies, catwalks, or overhead platforms.

G-E sealed dry-type transformers with these same superior features are recommended for use where dust- and dirt-laden atmospheric conditions exist.

Product leadership is just part of the story. General Electric's full line of transformers for industry* is certified to deliver **full value** for your transformer dollar . . . in terms of superior products . . . plus faster order handling and shipment . . . plus complete service before, during, and after installation. If you examine the **complete package,** we're confident you'll recognize the full value for your transformer dollar offered by General Electric.

For complete information and application help, see your G-E Apparatus Sales Engineer or Agent today. Or write to Sect. 417-8, General Electric Company, Schenectady 5, New York.

* **Medium transformers (501 to 7500 kva), Open dry-type transformers (300 to 7500 kva), Sealed dry-type transformers (300 to 7500 kva), Distribution Equipment transformers (112½ to 500 kva), Integral Distribution Centers.**

Progress Is Our Most Important Product

GENERAL ELECTRIC

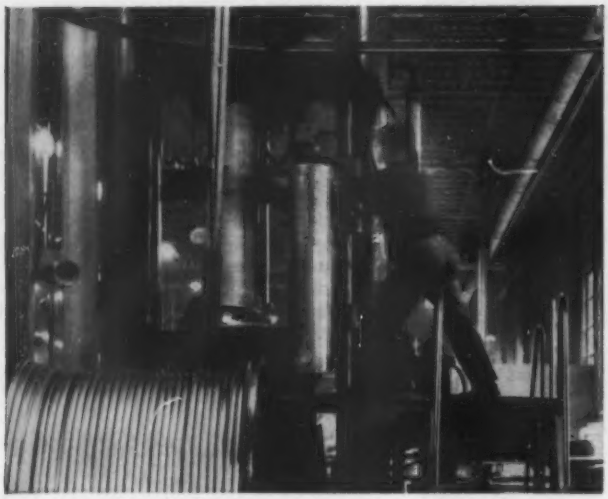
SUPERIOR DESIGN, FEATURES, PERFORMANCE of General Electric transformers is typified by use of new inorganic Alpholite insulation (left) and sound level research.

FASTER SHIPMENT through rapid processing of orders . . . computer design . . . repetitive manufacture.

COMPLETE SERVICE . . . application engineers . . . installation engineers . . . 50 nearby service shops.

1. Compounding rubber to be processed into industrial hose. This spiral flow mixer at the Industrial Hose Plant of Swan Rubber Company is lubricated with Gulfcrown Grease and Gulf Harmony oil.

2. Sheeting-off compounded rubber flats, this processing mill is on the floor directly below the mixer. Gulfcrown Grease—a highly stable, water-resistant type—keeps the roll bearings in this mill operating smoothly.



5. Extruding lead overcoating on hose, this lead press has its hydraulic system filled with Gulf Harmony. Lead covering becomes template against which outside diameter of hose is forced under steam pressure, then cured.

6. Braiding reinforcement fibers on industrial hose. The high speed spindles on these braiders at Swan Rubber's Industrial Hose Plant are lubricated with Gulf Precision Grease #2. Gulf Harmony oil lubricates the spindle decks.

Swan Rubber cuts downtime 30% on 300 processing

GULF MAKES THINGS

"Over 10 years ago, with the help of Gulf engineers, we set up a comprehensive lubrication plan for our rubber hose production. Since then we have reduced downtime by more than 30% on more than 300 basic processing machines, and hundreds of auxiliary units, using only 6 Gulf greases and 3 Gulf oils."

That's the report from C. B. Jacobs, Plant Engineer of Swan Rubber Company, Bucyrus, Ohio—world's largest manufacturer of garden hose, and also a major producer of industrial hose. 95% of the lubricants in this plant are supplied by Gulf.

Shown above are a few highlights in the processing of industrial hose at Swan Rubber, where Gulfcrown Grease, Gulf Harmony oil and other Gulf lubricants made possible a 30% reduction in downtime.

In over 10 years of Gulf lubrication of Swan's ma-

3. Strip-feeding rubber to extruders for shaping into industrial hose. Gulfcrown Grease lubricates the bearings of this machine—and, as seen here, is also supplied to external components of the machine.

4. Extruding rubber like endless macaroni. This extruder, in another section of the plant, has many precision gears in its speed reduction units which regulate feed and speed. The gears operate in a bath of Gulf Harmony oil.

7. The finished product . . . Swan Rubber's industrial hose, some 300,000 feet of which are produced here daily. Only 6 Gulf greases and 3 Gulf oils provide complete lubrication for more than 300 basic processing machines.

8. Gulf man on the job helps Swan Rubber cut downtime 30% with the right Gulf greases and oils. Right, E. A. Jeffrey, Gulf Sales Engineer, with C. B. Jacobs, Plant Engineer, Swan Rubber Company.

machines using Gulf greases and oils . . .

RUN BETTER!

chinery, there hasn't been a single plant-stopping machine breakdown due to a lubrication problem—strong evidence that Gulf makes things run better.

How about your plant lubrication? Gulf engineers can help you reduce downtime and cut maintenance costs. Just call your nearest Gulf office. Or, write for illustrated bulletins on Gulfcrown Grease and Gulf Harmony oil.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

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Infra-Red
heating comfort
WITHOUT DUCTS, BLOWERS OR HEAT EXCHANGERS

WITH

Perfection Infra Red GAS Heaters *Schwank*

Fired by Natural, LP or Manufactured Gas

"Our high ceilings presented a difficult heating problem. However, with your Infra-Red Heaters our heating situation is absolutely perfect and the savings on fuel is most gratifying", says R. C. Sheets, Vice President of the Solem Machine Co., Rockford, Illinois.

"What has pleased us so immensely is the perfectly controlled temperatures that are maintained day and night; even during sub-zero weather. Most of our workmen wear only light tee shirts!"

Add to this a 97% reduction in electric power consumption; no maintenance headaches because there are no moving parts; low annual fuel costs; and you will understand why over 15,000 users of Perfection Schwank Infra-Red Heaters are equally as enthusiastic. CALL, WRITE OR WIRE FOR COMPLETE INFORMATION AND LITERATURE.

MATCH THESE FACTS WITH *ANY* OTHER HEATING SYSTEM!

Building Size: 200′ x 250′ x 28′ with 50′ x 50′ high monitor running the 250′ length—a total of 1,735,500 cu. ft. (not including office)

Construction: Galvanized sheet metal wall and roof with 1½" aluminum vinyl-faced fiberglas insulation throughout. Three large overhead doors—three small walk-in doors

Mounting Heights: 82 units installed at 26′—28′—42′—48′

Temperatures: 70° during working hours—60° nights & weekends

Degree Days: 5118

Installed BTU: 3,888,000

Fuel Consumption (Infra-Red): 43,969 gal. Propane at 10¢ (a total of $4,396.80 for the period studied)

Electrical Cost (estimated for Infra-Red): $14.00

Estimated Heat Loss (computed on ASHRAE basis): 3,640,000 BTU per hr.

Average Inside Temperature: 63.5° F

Degree Days For Period (base of 58.5): 4378

Probable Fuel Consumption (ASHRAE—efficiency of 80%): 5,975,000,000 BTU

Actual Fuel Consumption (Infra-Red): 4,020,000,000 BTU

Period of Study: November 19, 1958 to March 13, 1959

Perfection industries 1135 Ivanhoe Rd., Cleveland 10, Ohio

division of Hupp Corporation/ licensee of American Infra-Red Radiant Co.

Under Schwank U. S. Patents 2775294 and 2870830 and pending applications

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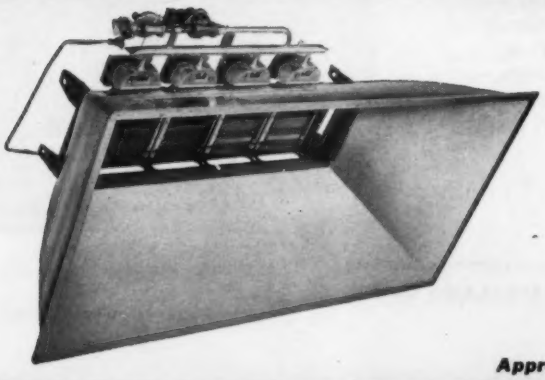
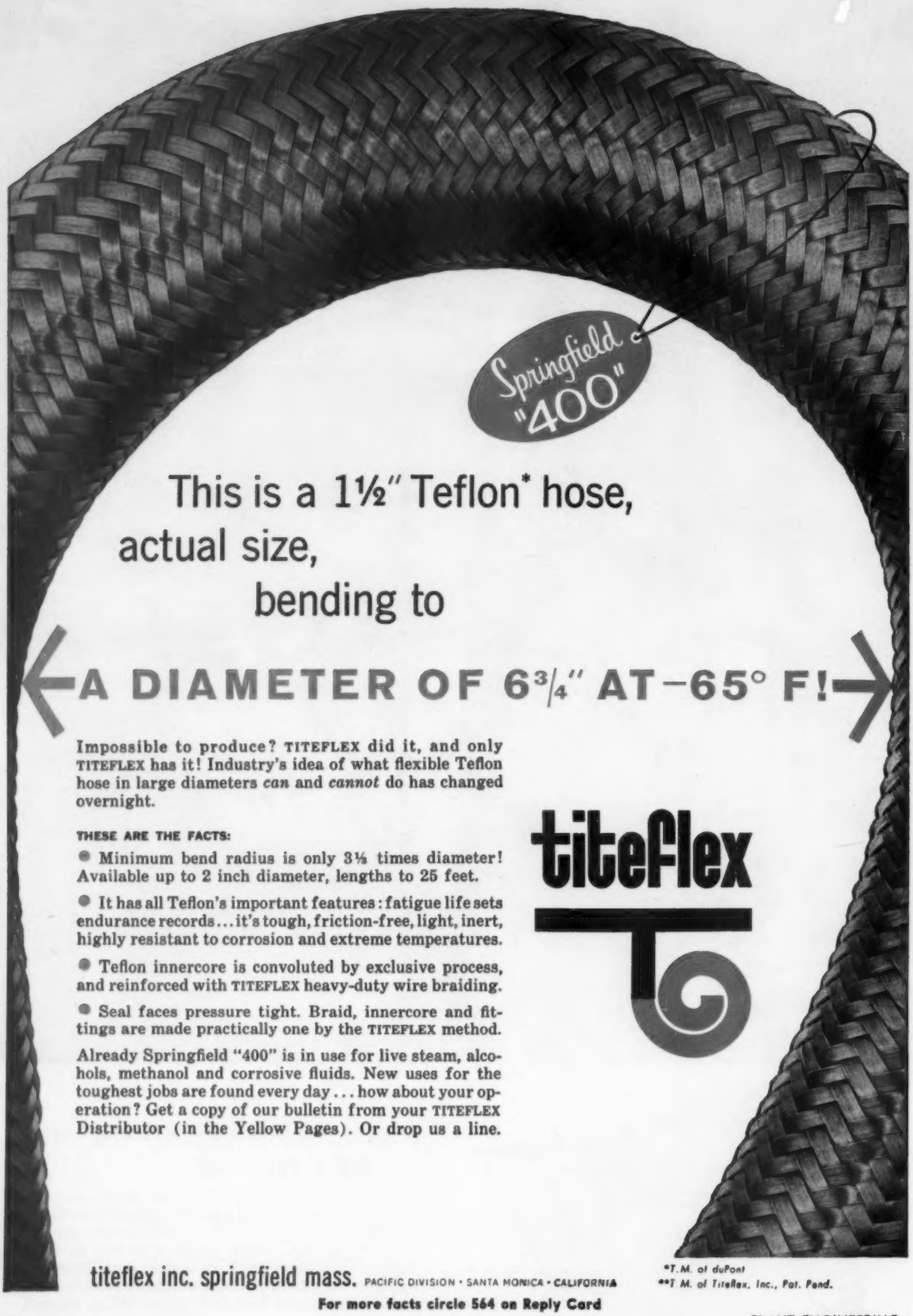


WARM THE MAN AND THE JOB ... *NOT* THE AIR

The rays of heat energy from these generators, like the rays of the sun, heat only the objects they touch and are not wasted on the air around the objects. Once the energy waves strike a person in their path, or the floor, wall or machinery, they are transformed into heat. The result is uniform heating comfort no matter how fast temperatures change.

Approved by American Gas Association, Underwriters, C.G.A. and C.S.A.



This is a 1½" Teflon* hose, actual size, bending to

A DIAMETER OF 6¾" AT −65° F!

Impossible to produce? TITEFLEX did it, and only TITEFLEX has it! Industry's idea of what flexible Teflon hose in large diameters *can* and *cannot* do has changed overnight.

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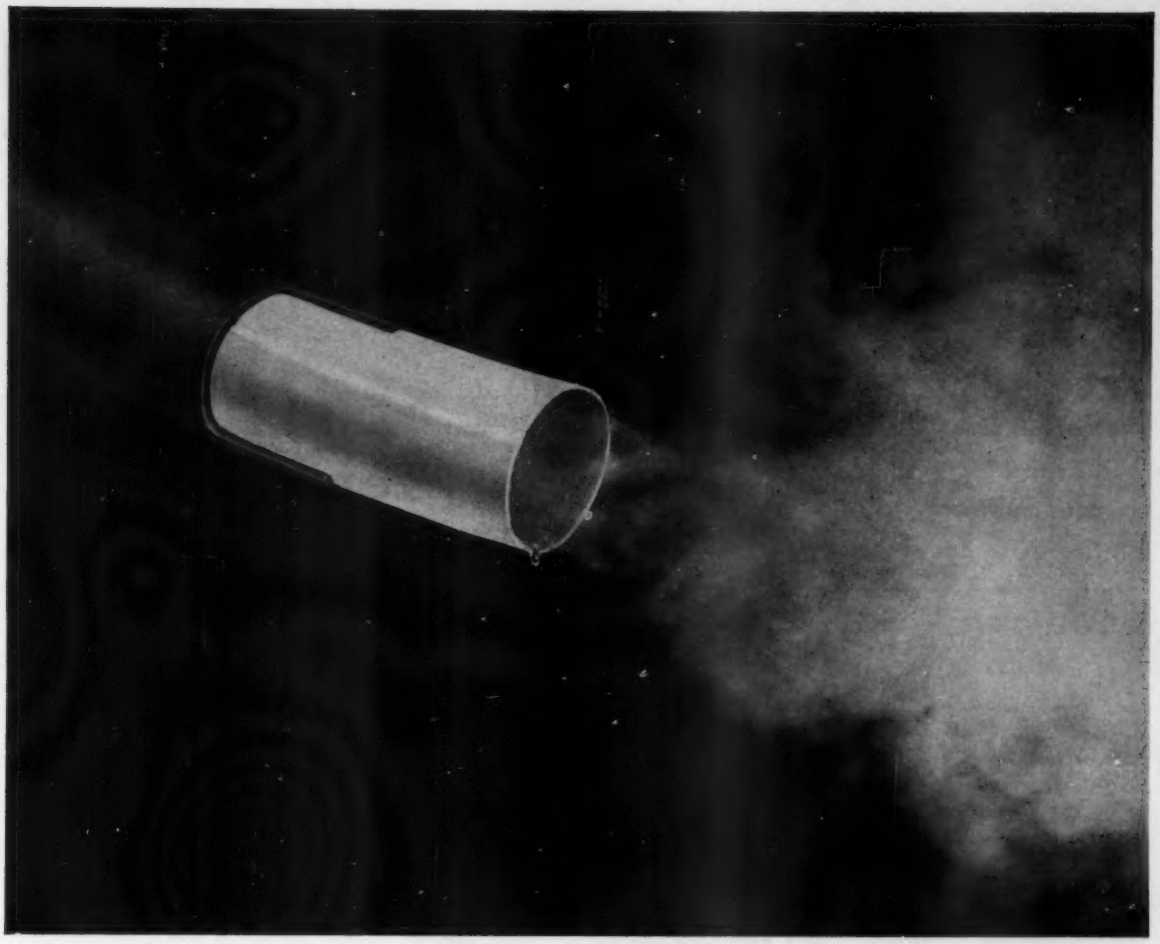

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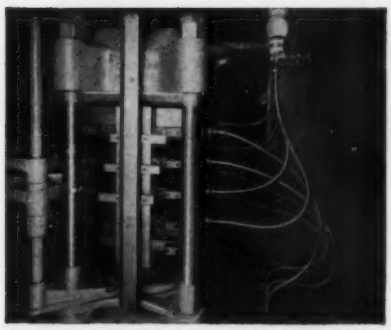

Connections on this platen press carry 350°F. steam and condensate, alternating with 45°F. water. Hoses lined with TEFLON have withstood this service continuously since May, 1955, with no signs of cracking or wear. The anti-stick properties of the TFE resin markedly reduced plugging from scale formation.

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WHAT'S JUST AHEAD IN THIS ISSUE?

- CONDENSATE in compressed air has both volume and value—use it, it is to your advantage. That's the sum and substance of plant-engineered research at the Pacific Coast Division of Owens-Illinois, as reported in the article starting on the next page. Advantages of the installation and operating procedures followed at this plant are several, but the two most important are improved air quality and lower costs.

- DO YOU HAVE a high burnout rate on expensive electronic tubes? If so, you will want to read the article "Controlled Voltage Is Good Business," starting on page 104. New curves indicate that 10 per cent overvoltage can reduce tube life by as much as 80 per cent.

- CONTINUING our series on Construction Cost Estimating, Part 3 presents help in figuring the cost of steel for an industrial building. Factors for various bay sizes have been tabulated, to provide a basis for quick cost estimates on any size of building. The article starts on page 113.

- LAYING OUT locker and shower facilities need not be a chore. If all the information is collected and set down in advance, you will have a definite pattern to follow on any future layout. Such things as state codes, past requirements regarding equipment and type of facilities all enter into the picture and can make the job easier. For some helpful suggestions, turn to page 119.

- WHEN MONSANTO found that the cost of a mechanic's time spent walking to the storeroom was often greater than the cost of the part he went for, their "giveaway" program was initiated. High-turnover parts, expensed on receipt, were put in storage racks in plant areas for no-requisition pickup as needed. Savings? Turn to page 129 for the full story.

- COME ALONG with our electrical editor, Vern Kempf, on a trip through industrial England, Belgium and France. During your tour you will learn some of the things the boys overseas are doing. For the complete report on Vern's numerous visits, see the article beginning on page 134.

- STORAGE SPACE and traffic aisles can be efficient, vital parts of a producing plant—or they can be wasteful, time-consuming, space-consuming white elephants. It all depends on the skill and engineering that went into their planning. The principles that guide one of the country's leading materials handling consultants are detailed in the article starting on page 142.

VAPOR IN COMPRESSED AIR—

MAKE IT WORK FOR YOU, NOT AGAINST YOU!

Actual demonstrations, following detailed study by Owens-Illinois plant engineers, proved that warm compressed air was better, cheaper

By JOHN G. HOWELL, M.E., General Engineering Dept., Pacific Coast Div., Owens-Illinois

AIR WHICH WE breathe contains some water as a vapor which is essential to our existence. Yet this same water vapor can be a plague in compressed air systems and affect the operation of air powered equipment. Condensate, if not removed from the system, can choke up and stop air operated equipment, wash away lubricants to cause accelerated wear, and corrode the insides of air lines and air receivers.

In order to minimize these effects it is standard procedure to install after-coolers on the discharge of the compressors and provide systems of moisture separators, drip legs, blow-down valves, filters, etc.

All of this equipment is costly to install, requires constant maintenance, and in certain instances actually robs the compressed air of much of its energy with a substantial loss in dollars for power. Furthermore, short of removing the moisture by chemical absorbers or by refrigeration, no system of after-coolers, separators and traps, etc., removes enough of the moisture to avoid all of the troubles that are inherent with moisture laden air. This is particularly true of the large capacity low pressure air systems which operate at about 45 psig, and which we use to power the bottle forming machines in our three glass container manufacturing plants on the Pacific Coast.

Aftercoolers—Pro and Con

We also found that no matter how big the aftercoolers were, there was always enough water vapor left in the compressed air to condense and give trouble as the air became cooled by subsequent expansion through control valves, and in the cylinders of the air-operated bottle machines.

However, one day we decided to take a fresh look at the problem. Borrowing a page from some earlier experience with steam systems, we wondered if it were not practicable to keep the temperature of the air high enough so that the water vapor was in effect superheated. Thus, it could not condense out until the air had done its work.

It was also immediately evident that by keeping the air warm, or even reheating it, less air—as measured in standard cubic feet entering the compressors—would be required. This, of course, meant that less power dollars would be used to operate the bottle-forming machines and was in itself a desirable objective.

Our first move was to study the temperature saturation curves of water vapor in air for a range of pressures from atmospheric to 45 psig pressures. The second move was to make an actual demonstration in an operating plant of the conclusions reached from these studies. And finally, when we had convinced the operating people of the practicability of this different approach in handling the water vapor problem, we then altered the compressed air systems accordingly.

Internal Oil Fires

At the same time we were alerted to the possibilities of introducing conditions which might result in more trouble than the condensed water vapor had been. For example, when a compressor discharge valve

fails the temperature of air increases alarmingly and, if not promptly detected, it can cause the lubricating oil that is carried over into the piping to ignite and burn with considerable intensity.

With a system in which there are aftercoolers in the discharge, the fire usually stops at the aftercoolers. Whereas, without aftercoolers the fire may spread throughout the piping system and thus be far more difficult to bring under control. But more on this phase of the problem later.

Water Vapor Curves

Our first step, as mentioned before, was to study the psychometric aspects of our problem. This we did by drawing the few curves shown in Fig. 1. The lower family of curves shows the water vapor content in atmospheric air plotted against temperature for 50, 75 and 100 per cent relative humidity conditions and at atmospheric pressure. The upper curves are the moisture saturation lines for air at 15, 30 and 45 psig. At temperatures above these lines, the water vapor is superheated. At temperatures below those of the lines condensation occurs.

In our theoretical analysis of the problem we assumed, perhaps somewhat hypothetically, that here in the San Francisco Bay Area of California the average air inlet temperature is 70 F and the average relative humidity is 75 per cent. This means that each pound of dry air has about 0.0115 pound of water vapor. When we now compress this air in a single stage machine, the discharge air temperature leaving the compressor rises to about 300 F. This is about 195 deg above the saturation line at 45 psig for the assumed humidity conditions.

Thus, if we want to condense out any moisture we must first cool the air to 105 F before a single drop of condensate is formed. If we want to remove at least one-half of the moisture content as condensate as a reasonable return for our effort, we must cool the air to 82 F.

The most practical type of cooling system to install and operate is an atmospheric cooling tower wherein the cooling water may approach to within 5 deg of the atmospheric temperature, and in our operations during a normal day the temperature of the water leaving a tower is about 75 F. Of course, at night time and during the winter the temperature may go much lower.

Cooling Leaves 60 Per Cent

With water leaving the tower at 75 F, we can expect to cool the air in an aftercooler to within 15 deg of the water temperature which in this case is 90 F. Thus, for the humidity conditions noted above we will remove only .0045 pounds of water per pound of air. This still leaves in the air about 60 per cent of the water vapor that we had at the beginning.

At the same time in cooling the air we reduce its effective volume so that more air is required to do the same amount of work in the air driven bottle-forming machines. For example, by referring to Fig. 2 note that the quantity of compressed air that is required to fill a cylinder with air compressed to 45 psig and at a temperature of 300 F, which was the temperature of the air as it left the compressor, is 35.6 per cent less than if the air is allowed to cool to 100 F.

It means that if compressed air could be delivered to a cylinder at 300 F by preserving the heat of compression, 35.6 per cent less air would be required. Of course, retaining the air at this temperature is not always practical and the actual delivered temperature is perhaps closer to 150 F. This at least gives approximately a 13 per cent saving as compared to delivering air at a temperature of 80 F as might occur in a system with aftercoolers and no line insulation.

There is a further advantage to keeping the moisture in the air as water vapor. The effective volume of compressed air and water vapor is further reduced by the amount of water vapor that may condense out before the air is able to do any work.

The amount of effective increase in the volume of the compressed gas at 45 psig that is contributed by the water vapor is shown in Fig. No. 3. For air entering at 75 per cent relative humidity and 70 F, and a moisture content of .0115 lb per lb of dry air the water vapor adds 2 per cent to the volume of the air. To remove one-half of the water reduces the efficiency of the system by 1 per cent.

Inasmuch as approximately 40 per cent of a glass container plant's power bill is for compressing air, any procedure that permits using the air with a maximum efficiency can pay worthwhile dividends.

Since our studies indicated that little if any water vapor would condense out in the aftercoolers under normal conditions, we made an inspection at our Oakland Plant and ascertained this to be a fact. We then persuaded the plant engineer to shut off the aftercoolers completely and make careful note of any change in the amount of compressor power required to operate the plant. As expected, there was a reduction which closely coincided with what we had calculated from our psychometric data.

About the Author

John G. Howell received his B.S. degree in Electrical Engineering from M.I.T. in 1929. His professional registration pertains to both the electrical and mechanical branches of engineering in two states, California and Oregon.

The author is a veteran of World War II and is an active U.S. Navy reservist with a permanent rank of captain. He is a member of the American Society of Mechanical Engineers.

His active interest in compressed air problems dates back to 1938. At that time he was engaged in electric power consumption tests while operating with and without aftercoolers.

Careful measurements were also made to determine the air temperature leaving the main aftercooler and at the individual machines. With the aftercooler in operation, the air temperature leaving the cooler was about 120 F—(obviously the cooler was too small for the job)—while the air at the machines ranged from 75 to 90 F. Thus, condensation was occurring only at the machines, the very place where it was not wanted and where the facilities were inadequate to care for it.

With the aftercooler off the air entered the forming machines at temperatures ranging from 125 to 200 F, depending upon how far the machines were away from the compressor room. When the system piping had warmed up the condensation problems at the forming machines were significantly minor. It will be admitted, however, that the condensation which occurred at the machines during the warm-up period was greater than had been experienced with the aftercooler in operation, since the aftercooler did take out much of the condensate during the initial part of warm-up.

Having proved the economics and the practicability of not cooling the air as one means of handling the condensate problem, we then embarked upon a program of insulating all major compressed air lines and receivers in order to keep the air as warm as practicable. We even investigated reheaters for the air but abandoned the idea, for it did not appear that the operating people would be happy with air that was too hot and a hazard to personnel.

While all three of our glass container plants on the West Coast

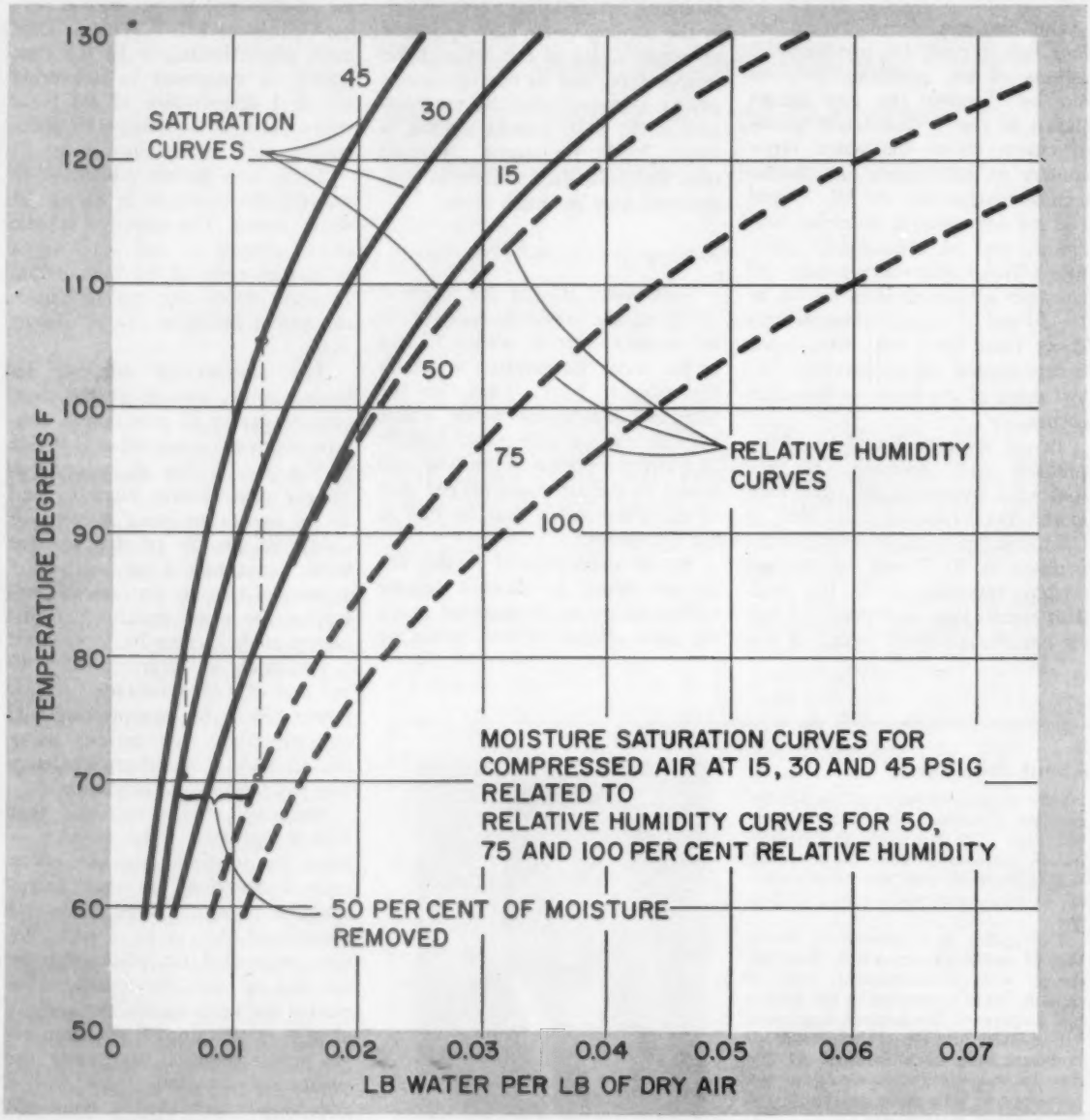


Fig. 1. To find weight of moisture per pound of air at various relative humidities and temperatures use dotted curves. At temperatures above solid curves vapor is superheated. Condensation occurs at the points below the solid curves.

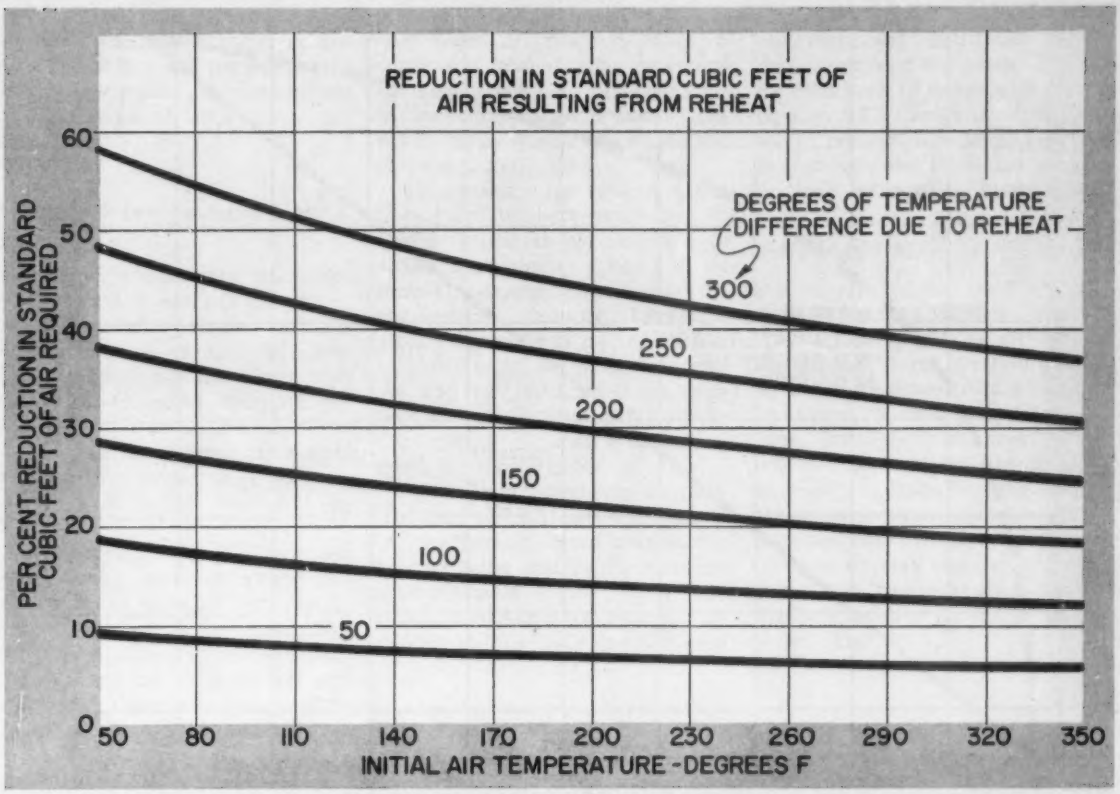


Fig. 2. This chart shows the reduction in volume of standard air that can be attained by the application of heat.

now have most of the major piping and receivers insulated we have not as yet carried the insulation as far as it perhaps should logically be carried. But we hope to some day.

Among reasons for not pushing this program is the hazard of internal oil fires. Such fires, when they occur, are exceedingly difficult to combat if the lines are insulated. Also, with an insulated line, the air temperature remains high. The internal oil fire tends to spread more readily, particularly when there are no aftercoolers to act as fire traps for the fires that start at a compressor and are generally caused by discharge valve failures.

It should be mentioned that in recent years, with the improved materials and design of valves, valve failures have become less frequent; nevertheless, they are always a potential hazard.

In view of this situation, it was natural that our next line of attack was to minimize the possibilities of oil fires and, if they occurred, to attempt to limit their extent. While this was done as part of the problem of minimizing the nuisance of condensed water vapor, it was also done because an internal oil fire is a hazard even with the conventional, uninsulated system fitted with aftercoolers.

6-Point Program

Minimizing the possibility of internal fires required a six-point program as follows:

1. The proper selection of cylinder lubricating oils and the careful adjustment of the feed rates.
2. The regular inspection and maintenance of discharge valves and the thorough removal of all carbon deposits from valve parts and pockets.
3. The frequent blowing down of all the drip legs in the distribution systems to minimize the amount of oil in the systems that might feed a fire.
4. The regular cleaning of the interior of the air lines and of the receivers to remove all carbon deposits.
5. The establishment of proper construction procedures when additions must be made to the systems.
6. The installation of an air temperature alarm system which would detect any sudden rise in the temperatures of the air from each cylinder of each compressor, which rise could be the result of a valve failure.

The above program may appear to be nothing more than good practice for the maintenance and for the operation of a compressed air system. It was rather surprising to us, as we analyzed each point, to find deficiencies in our own systems.

For example, we found low points in the lines where oil could collect but these points were without blowdown connections by which this oil could be drained. Also, we found points that were fitted with drains but which were only being occasionally blown down. And we found that in one instance no effort had been made in years to clean out certain sections of the piping; it took a fire to point out this situation.

Regarding cylinder lubrication

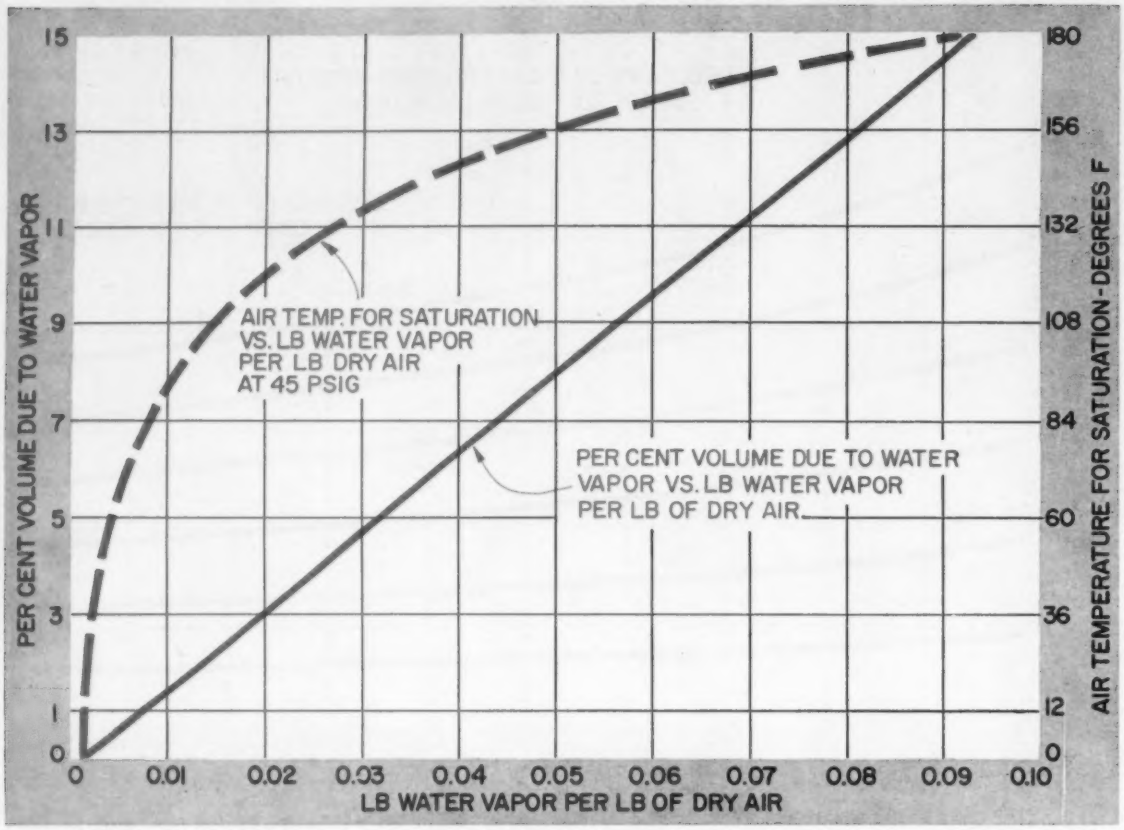


Fig. 3. Retention of heated vapor in compressed air in effect increases volume available for work. Note curve No. 2.

we use only top grade medium V.I. (viscosity index) mineral oils of 30 SAE viscosity and high flashpoint. These oils do not leave the hard, dry carbon deposits which are characteristic of high V.I. oils and which, it is believed, are conducive to starting internal fires. They leave a soft oily film which has less tendency to build up deposits on the insides of the piping which then requires less frequent cleaning.

Oils should not contain metallic detergent type additives which are known to glow and hence become a possible source of ignition.

The use of the non-inflammable types of oil has been considered but their high cost seems to present a definite obstacle. On the other hand, since it is probable that over one-half of the lubricating oil fed to the cylinders of an air compressor collects in low points in the distribution system, a reclamation program that would realize a major recovery of these premium oils would substantially lessen their cost and so increase their attractiveness. We have therefore outlined a program to determine how much oil is actually blown down at low points in the system and the practicability of attempting to collect this oil for reclamation and re-use.

Maintenance of Valves

Discharge valves are removed once a year and thoroughly cleaned and carefully inspected for damaged channels and springs. Any part that appears questionable in any way is discarded. Inlet valves are overhauled every two years. A spare set of valves facilitates this maintenance job and reduces the time a compressor is not available for operation.

While the regular blowdown of low points in the line prevents the accumulation of pools of oil that can feed a fire, we believe that an even better situation is obtained if these low points are fitted with drain legs or pots that are separated from the heat of the system by a suitable length of small diameter pipe. Thus, this oil, as it accumulates, is much less likely to feed and supplement an internal fire than if it lay in the main distribution piping and were thereby held at a high temperature.

When making additions to the system, we use Schedule 40 seamless pipe and welded construction for all pipe sizes 4 in. and above. Slip-on flanges eliminate the need of internal welds while the use of backing rings at butt joints prevents welding dross from being deposited inside the line. Welding dross, it is believed, can act as a catalyst in the presence of oil, heat, and oxygen to start a fire. Back-up rings are not used where the interior of the weld can be wire brushed free of any welding dross.

There are reported to be new welding procedures which, it is claimed, do not create welding dross and preclude the need for back-up rings. We have not yet had occasion to try any of these procedures in making additions to our air distribution systems.

Of course, insisting on sloping all lines whenever possible in the direction of flow and providing drip legs at low points are standard requirements for all additions to the air system.

Testing Air Temperature Alarms

Each air temperature alarm device on each compressor cylinder is regularly tested by turning the calibrating screw down until the alarm sounds. These are then reset with the alarm to sound when the air temperature rises to 50 deg over the normal temperature. This temperature for single stage 45 psig compressors ranges from 275 to 325 F.

So far our premise has been that large, steady users of compressed air are better served if there are no aftercoolers and if the distribution lines are insulated to preserve both the heat and energy in the air, and that by so doing moisture condensation need not be a problem.

Intermittent Air Use

However, where the use of compressed air is small or intermittent, the distribution lines become cool and moisture condensation can be a real and serious problem and one which we generally handle as follows:

Air for these miscellaneous uses is passed through an aftercooler of liberal size and is brought down to a temperature that is 15 deg or less over the temperature of the entering cooling water. Any condensed water at this point is separated out, preferably in centrifugal or baffle type separators. Similar type separators may also be provided close to the points of use to care for the additional condensation as further cooling occurs in the distribution piping.

Drip legs and supplementary separators may also be installed after each pressure regulator unless, of course, the regulator discharges into a receiver. Traps are used where large amounts of condensate must be handled, whereas drip legs, which are regularly blown down by hand, are used where the condensation is minor. Practically speaking, moisture separators are only useful in preventing slugs of condensate from affecting the equipment. Separators do not take care of subsequent condensation that will occur as the air expands in the equipment to do work.

To minimize the rate at which traps inevitably become affected by sludge we use an old idea of providing a separating drum with an internal non-siphoning tee in the condensation chamber. Then, the sludge that collects on the surface of the condensate need not enter the trap but is blown down from time to time. Typical details of the construction of such a separating drum are shown in Fig. 4.

Small lines supplying intermittent users of air, if exposed to freezing weather, are traced with electric heating cable and lightly wrapped with insulation.

Air for instrumentation is reduced to 30 psig and passed through a second aftercooler and separator, and distributed at 30 psig throughout the plant. The air for each bank of instruments passes through a filter and separator. Even so, to prevent waterlogging of the instruments, the filter and separator must be regularly blown down.

Dehydrated Air

Perhaps the ultimate solution will be to dehydrate all air used in instruments by refrigeration and/or by chemical means. And while this procedure is readily justified for large installations of instruments, we have not yet thought it practical in our plants. Nevertheless, as the instrumentation of our processes becomes more extensive in the years to come we may one day find ourselves with special systems supplying moisture-free air for all instruments. **End**

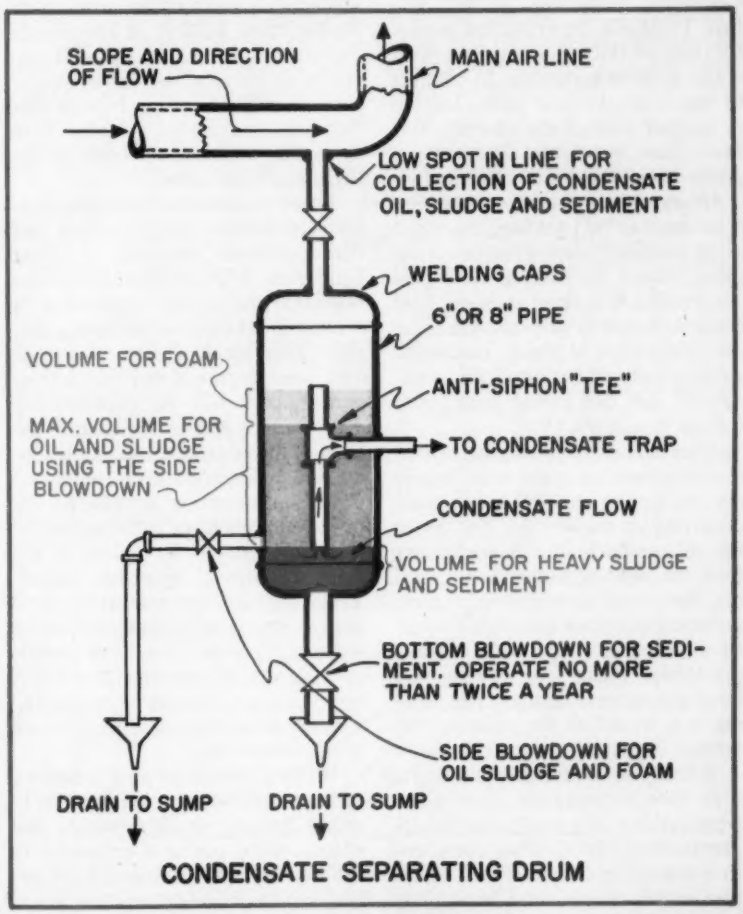

SLOPE AND DIRECTION OF FLOW
MAIN AIR LINE
LOW SPOT IN LINE FOR COLLECTION OF CONDENSATE OIL, SLUDGE AND SEDIMENT
WELDING CAPS
6"OR 8" PIPE
VOLUME FOR FOAM
ANTI-SIPHON "TEE"
MAX. VOLUME FOR OIL AND SLUDGE USING THE SIDE BLOWDOWN
TO CONDENSATE TRAP
CONDENSATE FLOW
VOLUME FOR HEAVY SLUDGE AND SEDIMENT
BOTTOM BLOWDOWN FOR SEDIMENT. OPERATE NO MORE THAN TWICE A YEAR
SIDE BLOWDOWN FOR OIL SLUDGE AND FOAM
DRAIN TO SUMP
DRAIN TO SUMP
CONDENSATE SEPARATING DRUM

Fig. 4. Cross-sectional drawing showing the inclusion of non-siphoning tee.

CONTROLLED VOLTAGE Is Good Business

By ANTHONY TERZANO, Application Engineer, General Electric Co., Pittsfield, Mass.

PRECISE CONTROL of industrial plant voltage can help solve many costly maintenance problems. An example is found in the recent experience of the C. Howard Pen Company, Statesville, North Carolina. To handle the expanded market for their product, this company built a new plant in Statesville. In contrast to the original home plant, located in another part of the country, this new plant purchased unregulated power from the local municipality.

Heart of the production operation is a number of welding machines using relatively expensive thyratron tubes. These are used to weld precious metal to a small stainless steel blank to form the pen nib. Realizing the sensitivity of these machines, welding timers were installed to compensate for the minor anticipated voltage variations.

After actual manufacturing operations commenced it was soon apparent that operational difficulties were occurring on the welding line. Since the voltage fluctuations were greater than the welding timers could handle, the machines required frequent servicing to replace burned out tubes. In addition, a higher than normal production reject rate was encountered due to weld failures. This trouble was traced to the variable line voltage supplying the machines.

A study soon revealed that thyratron tube replacement costs alone were running at a yearly rate of approximately $2000. This compared to a normal replacement cost of approximately $100 at the home plant operating under good voltage conditions. In addition, losses were being incurred due to the high reject rate due to weld failures.

An economic analysis of this situation indicated the necessity of good voltage conditions on the power lines feeding these welders. A line voltage regulator was purchased and installed to stabilize the welder power supply. It is interesting to note that the cost of the regulator was less than the yearly replacement costs of the thyratron tubes alone.

There is a definite economic relationship between proper voltage and the operational efficiency of plant equipment. It should be realized that whenever the electric equipment in a plant is operated at voltages other than their specified nameplate ratings, some degree of sacrifice in their performance will be encountered. This sacrifice may reflect itself in the form of lower production output, increased maintenance costs, increased power consumption or reduced life of the equipment or its components.

As an example, let us look at the general purpose induction motor. This is probably the most widely used item of electrical equipment found in industrial plants. The most significant effects of low voltage on this motor are a reduction in its starting torque and an increase in its full-load temperature rise.

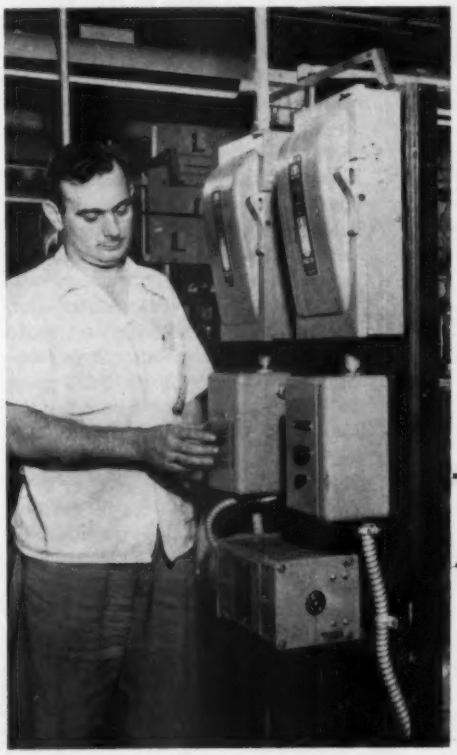
Where starting and running torques of motors are involved, as in punch presses, shapers, pumps and cranes, a 10 per cent reduction in the line voltage will cause a 19 per cent reduction in torque. This would appreciably affect its operation and the output of the machinery it is driving.

On the other hand, overvoltage on an induction motor will create an increase in starting torque, increased starting current and decreased power factor. This may, in turn, cause couplings to shear, cause excessive voltage drops in the line on starting and increase power costs due to power factor penalties.

Where sizeable loads of incandescent lamps are found, poor voltage conditions can nullify a large portion of the total investment in lighting equipment. For plants operating at 10 per cent below rated voltage, the investment in the lighting system is only working at 70 per cent of its full efficiency. A 10 per cent overvoltage will reduce lamp life to less than ⅓ normal, thus increasing lamp replacement costs by three times. If you feel your lamp replacement costs are excessive, checking the voltage would be a good place to start when looking for ways to lower costs.

Production heat treating equipment such as electric ovens, induction heaters and infrared lamps are also adversely affected by poor input voltage regulation. A drop in voltage

Induction voltage regulator, bottom, controls yarn tension in textile mill.



on this type of equipment will result in a reduction of heat output while an overvoltage will increase heat.

The first condition will mean lengthened process time with resultant decrease in production. The second, on the other hand, may cause scorching or burning of the product and a reduction in the life expectancy of the heating element itself. Where heating equipment is involved, uniform high production and a long equipment service life can be assured only by precise control of the voltage feeding the equipment.

Fluctuating voltage can also cause trouble with the electronic equipment that is finding increased utilization on fully automated production lines. This has its greatest effect on the thermionic emission of the cathode in electronic tubes. Voltages below normal, with the resultant loss of emission, will cause a reduction in output of the electron tubes.

This condition can cause serious effects where gas-filled tubes are involved. If insufficient emission is available to carry the load current, the gas molecules may bombard the cathode surface and destroy the tube in just a few minutes.

Although the effects of voltage fluctuations are most critical in connection with the operation of the cathode heater, they are also important in many other parts of the electronic circuit. Overvoltages as well as undervoltages will cause an excessive decrease in life of the components of electronic circuits of all varieties. The result will be a general increase in maintenance costs, and production losses due to the malfunctioning of the automated devices.

How To Control Voltage

One of the most popular methods of providing voltage regulation is through the use of an induction device designed to buck or boost the line voltage. This action raises low line voltages and depresses high line voltages to maintain a uniform voltage on the output of the regulator.

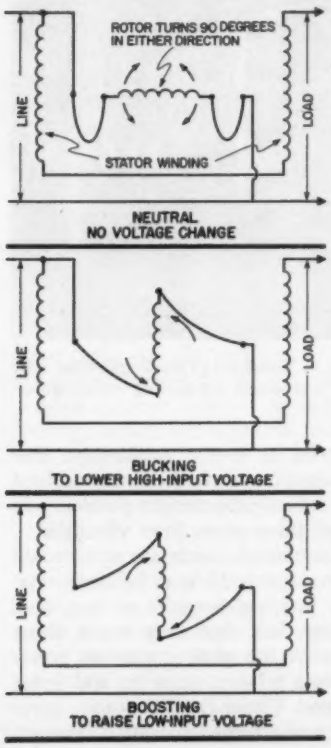
In effect, it is a variable ratio transformer. It consists of a laminated steel stator on which is wound the regulating winding, and a laminated rotor on which is wound the exciting winding. Changing the angular position of the exciting winding with respect to the regulating winding changes the magnitude and polarity of the voltage introduced into the power circuit. In construction, it is very similar to an electric motor except it does not rotate beyond 180 degrees.

The kva rating of an induction voltage regulator, in general, is much smaller than the full circuit power requirements where it is installed. The regulator rating required for any specific application is based upon the regulated kva and not on the load kva of the circuit.

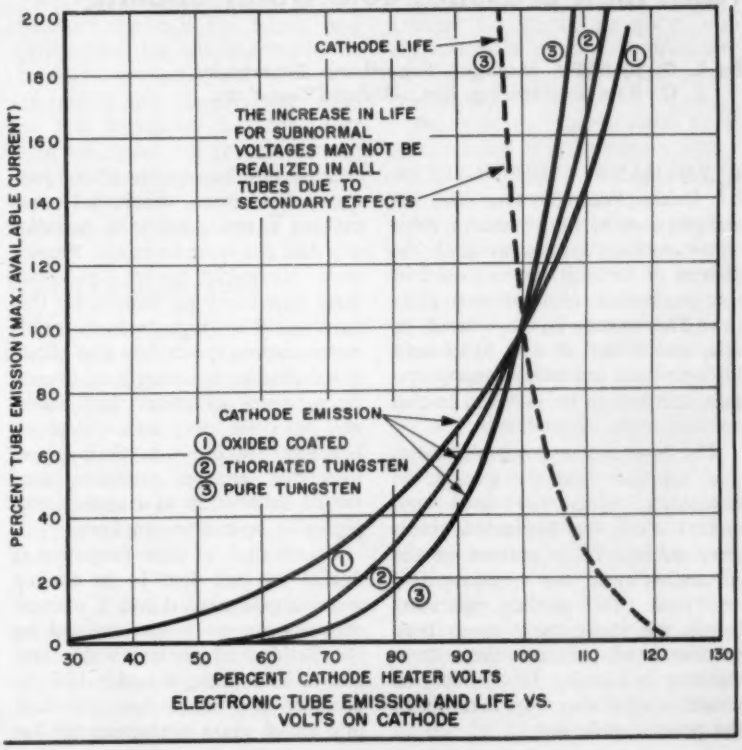
If we assume a 100 kva load where a regulator is required to compensate for 10 per cent plus or minus voltage variation, a 10 kva regulator will usually be sufficient to perform the intended function. The 10 kva represents the kva of regulation that will be involved in this power circuit.

With a good understanding of the effects of variable voltage, the plant engineer can carefully analyze the economic advantages to be gained by good plant voltage conditions. The resultant savings in maintenance labor and replacement supplies can readily be evaluated in dollars and cents. **End**

Rotor of regulator moves 180 degrees to boost or buck line voltage.



Electronic tube life, dotted line, is reduced almost 80 per cent by an increase in line voltage of only 10 per cent. High voltage means high tube costs.



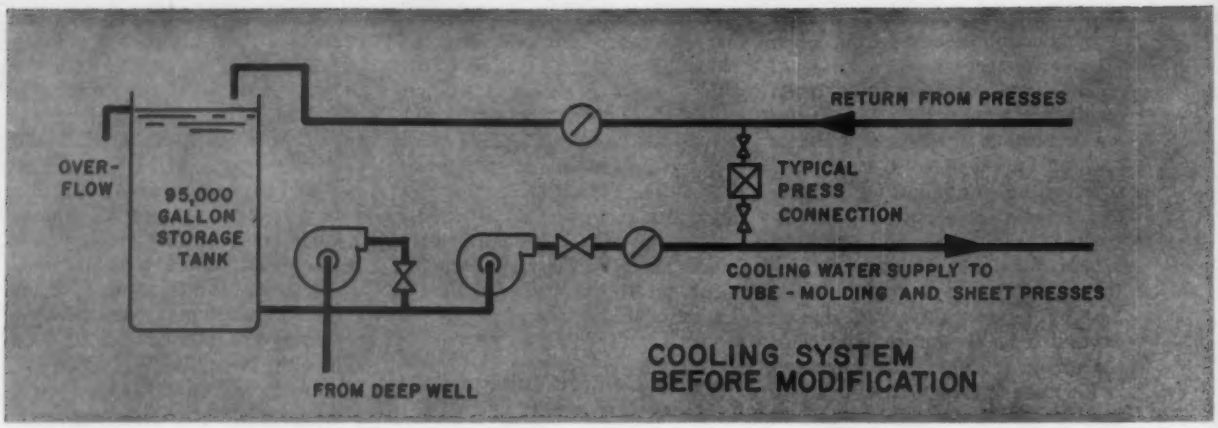

RETURN FROM PRESSES
OVER-FLOW
95,000 GALLON STORAGE TANK
TYPICAL PRESS CONNECTION
COOLING WATER SUPPLY TO TUBE - MOLDING AND SHEET PRESSES
FROM DEEP WELL
COOLING SYSTEM BEFORE MODIFICATION

Fig. 1A. Schematic diagram of low pressure, open cooling system used by Synthane before new system was installed.

HPCW COOLING SYSTEM— MAKES MONEY FOR SYNTHANE . . .

Better products, faster, just one bonus from high pressure cold water cooling

By E. G. HANSEN, Manager, Supertherm Department
J. O. Ross Engineering Div., Midland-Ross Corp.

SYNTHANE CORPORATION, Oaks, Pennsylvania, has installed a new high-presure cold-water cooling system to cool the platens of some 50 presses used in the production of laminated plastics. The system is the first of its kind and is tied in with Synthane's high-pressure hot-water heating system, the first to be installed in this country some 22 years ago.

The high-pressure hot-water system supplies heat for curing the laminates, while the cold-water system cools the laminated sheets after curing. Each portion of the processing cycle lasts approximately one hour. The cooling operation brings the sheets near room temperature and prevents them from warping and losing their shape, as would result if they were taken from the presses while hot.

Scale build-up within platen passages has been eliminated thus making it unnecessary to perodically drill out these openings. Presses were previously down for about three days every six months for this purpose. The high-pressure cold-water cooling system has also eliminated erosion of return lines caused by mixtures of steam and water, and has done away with violent vibrations and noise in these pipes. Formerly, erosion problems warranted installation of stainless steel piping in several return lines.

Elimination of scale formation is due to the fact that: 1, the cooling water is now treated and 2. mineral deposits are no longer created by the flashing of cooling water into steam. The water is under 180 psi pressure and hence does not flash into steam upon contacting the hot

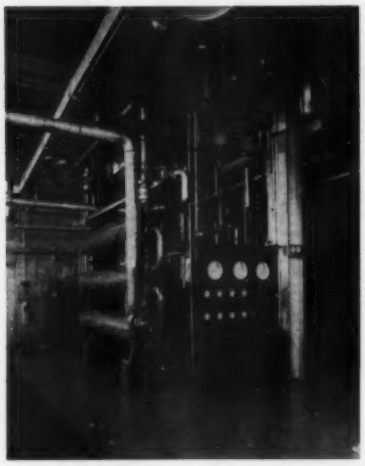


Fig. 2. Three-stage shell-and-tube type heat exchanger for cooling return water.

platens as it did previously. The elimination of flashing also solved the return-pipe erosion problem and freed these pipes from vibration.

Laminated sheets are now cooled more uniformly than by the previous standard-pressure system, due to the fact that only water flows through the platen whereas previously a mixture of steam and water existed. Under the old system, cooling water turned to steam immedi-

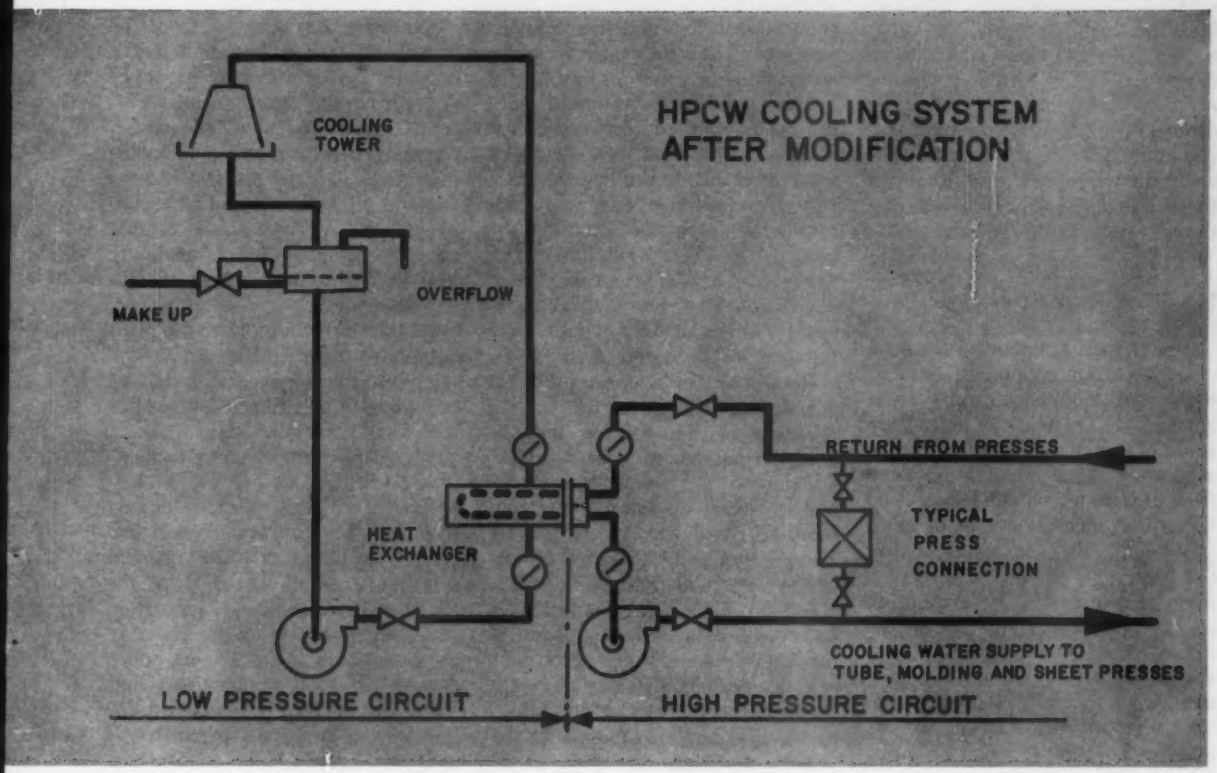


Fig. 1B. After modification. New installation has both low and high pressure circuits for cooling of press platens.

ately upon entering the platen, and as the forepart of the platen cooled, the water advanced and flashed into steam farther on. Thus, the platen was considerably cooler near the inlet than at the outlet and gradients existed in between. The existence of steam within the platen also offered considerable resistance to the flow of water, further deterring uniform cooling.

Under the old system, Fig. 1A, cooling water was taken from a well, or from a 95,000-gal open tank which collected return water from the presses, or from both. Since there was no way of cooling the water returned to the open tank, it often became too hot to use in cooling platens, and would be mixed with or replaced by well water. Under this system it was not possible to effectively treat the cooling water.

When the new system, Fig. 1B, was put in, a three-stage shell-and-tube heat exchanger, Fig. 2, was included in the circuit to cool the return water and enable the cooling water to be continuously recirculated. At the same time a cooling tower was installed on the roof of the power plant so that the recirculating system could be provided for the shell side of the heat exchanger.

Return water from the presses circulates through the tubes, and water from the cooling tower is circulated around them. The storage tank is now used to store water for fire protection and for other plant purposes. Make-up to the cooling tower system is supplied from the well. Water from the well also keeps the storage tank full.

Heat Exchanger Data

The heat exchanger consists of three, four-pass U-tube exchangers in series. Total heating surface is 1806 sq ft. The cooling tower is a forced draft type of 7,500,000 Btu per hr capacity. Water from the cooling tower is collected in a 500-gal storage tank from which it is pumped to the shell side of the exchanger.

The gray lines on the chart, Fig. 3, illustrate the extreme temperature variations in the water returning from the presses to the heat exchanger, and the relatively uniform temperature at which it is recirculated to the press.

The black lines indicate the extreme temperature variations in the water returning from the heat exchanger to the cooling tower, and the relatively uniform temperature at which it is recirculated to the exchanger.

Peaks in the curves result from simultaneous cooling demands of a number of presses. The evenness of the curves for the temperature of cooling water to the presses and for the temperature of tower water to the heat exchanger, attest to the efficient operation of these units. In installing this system, provision was made for the addition of a second heat exchanger and a second cooling tower when additional presses sufficiently increase the cooling load.

Piping system of the new installation is essentially the same as used with the old system. However, the heat exchanger has been added and tie-lines have been connected to the generating drums of the high-pressure hot-water heating system. These drums act as expansion vessels for the cooling system, and when water in the system expands due to being heated by the presses, it expands

into the high pressure hot water heating drums. Conversely, when the water in the system contracts, make-up water is supplied from the drums. Due to the tie-lines, the cooling system is pressurized by the water in the drums and is at the same pressure as the hot water of the heating system—180 psi.

No Scale Formation Now

Under the old cooling system, in changing from cooling to heating, when the high-temperature water entered the platens it picked up some of the cooling water and over a period of time minerals obtained from this water would cause scale formations in heating coils of other processing units, such as dryers, on the heating circuit. Conversely, when changing from heating to cooling, a certain amount of the treated high-temperature water would be lost. With the new system, water merely transfers from one high-pressure circuit to the other without introduction of harmful minerals to the hot water system and without loss of treated water.

Synthane's high-pressure hot-water heating system has been in use 23 years and during this period the company has not replaced a single boiler tube, and occasional overhaul is confined to washing out the boilers. There is no scale or deposit to remove.

Prior to installing the high-pressure hot-water system, two 150-hp boilers supplied steam at 175 psi to three coating machines, two 11-platen sheet presses, and 15 molding presses.

In changing over to the present system, connections were made to the steam drums of the existing boilers so that hot water could be taken from them. The boilers operate as before and the drums contain both hot water and steam. The steam acts as a cushion and prevents the superheated water from flashing into steam and causing hammer in the piping and possible damage. The steam space also provides means for water expansion when heating and for contraction when cooling. Drums are normally maintained at 180 psi and water is supplied at 370 F.

After making the proper boiler connections, flow and return mains were run to the manufacturing areas and the various pieces of processing equipment and space heaters connected between these mains. Connections were made by welding to enable use of lower cost valves and fittings and to reduce installation time. In installing the piping, there were no limitations as to inclines, as in the case where condensate flow has to be considered. Two circulating pumps were installed in the supply main in the boiler house, one as a stand-by. No changes were made in the heating elements of any of the various pieces of equipment.

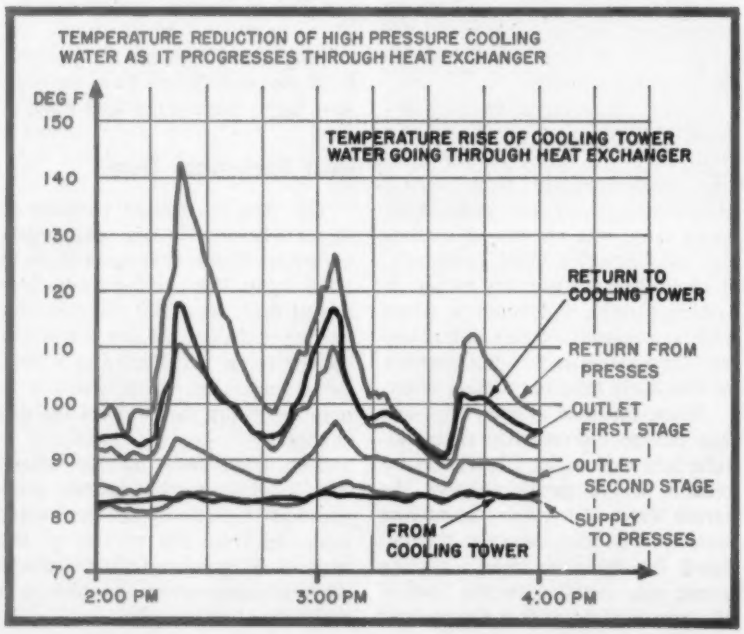
Prior to the change-over, both boilers were operated simultaneously nearly all the time to provide the required heat. After the change-over it was found that one boiler could carry the entire load. This is due to the reduced loss inherent in the high-pressure hot-water heaing system, and to the fact that the water acts as a heat reservoir which makes it possible to maintain relatively even firing rates while at the same time supplying the peak loads required to bring the large masses of platen metal to curing temperatures. This in turn results in lower boiler capacity requirements.

Synthane has grown from its original 30,000 sq ft until today it occupies some 195,000 sq ft of floor space. Plant equipment has increased until it now includes 6 coaters, 10 tube presses, 43 molding presses, 7 sheet presses, 32 tube winders, 11 hot wells and plates, 10 ovens, and various space heating equipment calling for a maximum heat load of approximately 25 million Btu per hr.

At the start, additions to the plant equipment were made simply by tying into the existing mains and by extending these mains. Shortly after the war, two new main headers were installed to accommodate increased expansion.

Several of the other additions include one operating and one stand-by pump, a 300-hp forced draft boiler, and forced draft for the two smaller boilers, increasing their output 50 to 75 per cent. At the present time, the 300-hp boiler carries the total winter load and since installation of forced draft, one of the two smaller boilers is sufficient for summer loads. The new boiler cannot now readily be jointly operated with the older ones but considerations are being given to modifying the system to make joint operation possible. **End**

Fig. 3. These graphs indicate high degree of efficiency of the heat exchanger and cooling tower. Heavy black lines show cooling tower water temperature rise; gray lines show temperature drop of the high pressure cooling water.



For Performance . . .

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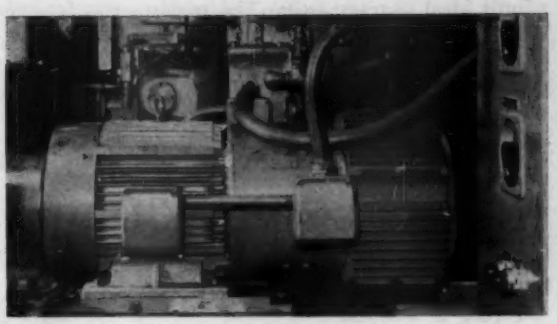


GMC Uses MODIFIED DRIVE for ADJUSTABLE SPEED APPLICATIONS

By F. W. DUNCAN, Plant Engineering Dept., General Motors Corp., Pontiac, Mich.

IN APPLYING various types of adjustable-speed drives available for application to grinders, the following points are important from the user's standpoint:

Safety from overspeed should be inherent.

Good and permanent balance should be inherent.

It should require minimum floor space.

It should require little maintenance.

It should be capable of repetitive performance.

It should not have reverse bends in the speed-torque curve.

Smooth starts should be characteristic.

It should provide adequate protection from abrasive dust.

It should have good inherent speed regulation.

High efficiency.

In our experience, modified Kramer drives are ideally suited to grinder applications, because they meet the requirements we have listed.

Their maximum speed is limited to the synchronous speed of the a-c motor employed, affording additional overspeed protection that can be readily obtained as will be explained. They have the necessary speed range, are readily controlled by a field rheostat, are relatively free of maintenance, require small floor space, and can be readily and permanently balanced.

We are now installing or have already installed 14 grinders using this new drive. Ten of these are rated at 25 hp, four at 15 hp, and all are for a speed range of approximately two-to-one.

All 14 grinders use a totally enclosed fan-cooled drive built on a unit frame (illustration above); that is the a-c wound rotor component and the d-c component are all on one shaft with two ball bearings. The drive is belted to the grinder from the a-c end.

The schematic diagram for this drive is shown in Fig. 1. (For simplicity, the control circuitry has been omitted.) In the diagram, the wound rotor a-c component, the d-c component, the slip rectifier, and the field power supply can be readily identified. The drive uses secondary resistance in the rotor circuit during starting to limit the torque. The drive can be set for high or low starting torque through the combined action of both the a-c and d-c components and slip resistance. By proper selection of resistance, any value of starting torque may be achieved with corresponding low values of inrush a-c line current.

For example, on a two-to-one-range drive with 200-per cent full load line current, starting torque would be approximately 400 per cent. The slip resistors are timed out by a pneumatic relay. Speed control is obtained by varying the excitation to the d-c component in the same manner as is done on an adjustable-speed d-c motor.

Overspeed protection is readily obtained on this drive by using a relay with two coils. One coil is excited through a recalibrating rheostat connected on the same shaft as the d-c field rheostat which controls the speed. The other coil is excited from a voltage which is the rectified a-c rotor voltage. On the first coil, as speed is increased, the voltage to the coil is increased; on the second coil, the rotor voltage reduces with increase in speed. The relay is set so that a 10 per cent increase in speed without a corresponding change in the recalibrating rheostat will cause it to drop out and thus stop the drive.

A 10 per cent increase in speed will mean a lower rectified a-c rotor voltage; hence the total ampere turns on the relay coil is less, since a change in speed was not called for by varying the rheostat and therefore the relay drops out.

We have recently purchased a lathe to machine crankshafts for which the modified Kramer system

affords ideal characteristics. The requirements for the drive are similar to those described for the grinders. In addition to these, we need a very slow speed and provision for rapid deceleration from high speed to intermediate speed to low speed and, finally, stopping.

This lathe uses a drive rated 25/50 hp, 550/1650 rpm. The drive is very similar to the drive used on the grinder. Although the overspeed circuit of the grinder application is not used, two other features are. One is a circuit to give the low creep or inching speed that we require; the other provides dynamic braking for quick slowdown and stopping.

Figure 2 illustrates the basic system. The standard wound rotor a-c component, the d-c component and the slip rectifier are readily identified. To provide the low speed for creeping, a transformer is used to supply a low a-c voltage to the slip rectifier. With the primary circuit open and the field of the d-c component energized, the unit will rotate at a low speed consistent with the choice of the a-c voltage selected.

For dynamic braking, a resistor is used across the d-c armature and full field applied.

In the application, the control circuits are so arranged that after the drive has been started through its cycle the field rheostat is cam-controlled to increase the speed from full-field speed to maximum speed. After a predetermined time, the drive drops back to 1000 rpm, because a fixed excitation is applied to the d-c motor field.

How To Obtain Rapid Slowdown

To obtain rapid slowdown, the dynamic braking relay is momentarily de-energized, under control of a timing relay to allow the unit to decelerate to the lower speed. Likewise, when the drive is dropped back to the creep speed, the dynamic braking circuit is used to obtain rapid deceleration. When the machining cycle is completed, the dynamic braking circuit brings the machine quickly to rest.

Rapid slowdown can also be obtained by using a relay in series with the d-c armature circuit so set that on low values of d-c current the dynamic braking circuit is closed. This relay will automatically control slowdown since current will flow in the relay as soon as the rectified d-c voltage drops below the back emf voltage of the armature and thus stops the braking action.

Yet another application which has presented a difficult problem in applying an electrical drive, involves a conveyor by which it is desired to move the workpiece from station to station. The drive starts, accelerates and stops. In most cases, two limit switches are used to provide a slowdown and stop. In some cases there are additional interlocks to be sure that the conveyor is in the correct position before the next operation can take place.

The maximum speed and the accuracy of stopping required will vary from line to line. Most lines will start and stop 200 to 300 times per hour. A two-to-one speed range will be adequate for these drives.

Since in some cases stopping must be smooth, a-c motors with d-c dynamic braking had proved unsatisfactory in this respect. We are now considering modified Kramer systems for these drives. The scheme of control shown in Fig. 3 requires the operation of the contactors only once for each start-and-stop.

On this type of control, with a two-to-one speed drive, a slowdown and stop limit switch, secondary resistance starting, and two dynamic braking contactors, the accuracy of stopping is given approximately by the formula $E = \frac{S}{240}$ where E is the error in inches and S is the top speed in inches per second.

On d-c dynamic braking, the torque developed is proportional to the speed. If for any cause, the speed is higher than normal during the stop, the braking torque is higher, or if speed is low during the stop cycle, the torque is lower. This characteristic of the modified drive reduces the error in stopping and assures a smooth uniform stop. **End**

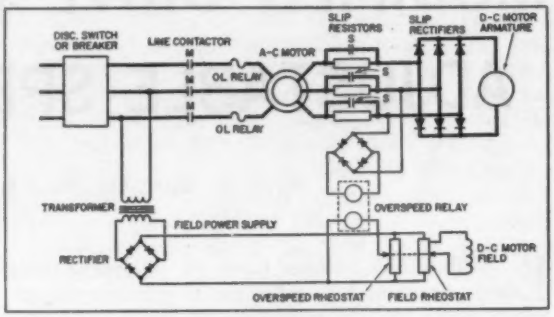


Fig. 1. Schematic shows application of a-c adjustable-speed drive to grinder. Drive is belted to grinder from a-c end.

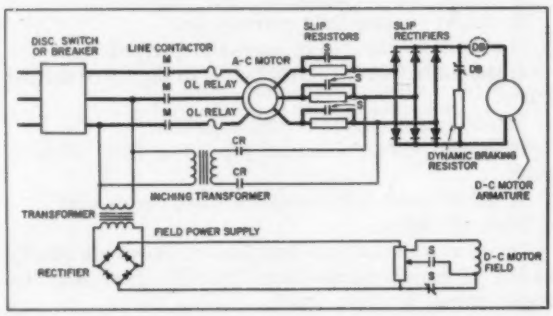


Fig. 2. Schematic diagram for application of an a-c adjustable-speed drive to a lathe used for machining crankshafts.

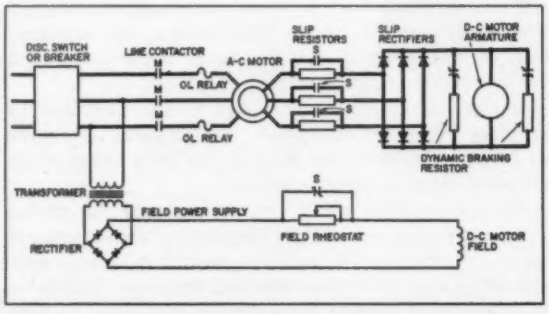


Fig. 3. Schematic for application of a-c adjustable-speed drive to conveyor for station-to-station transfer of work.

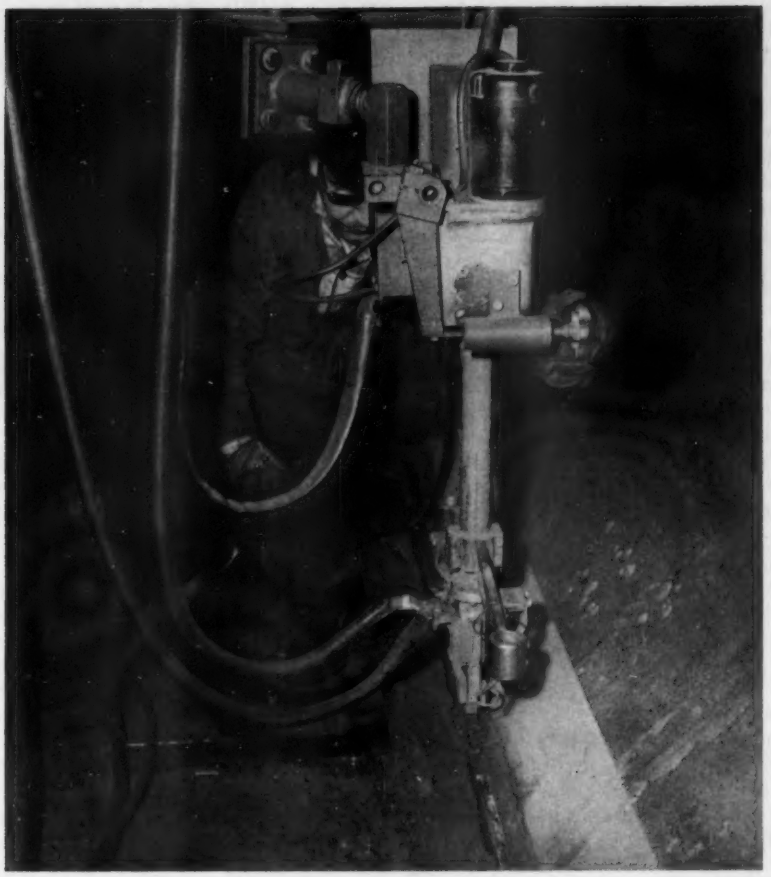


Fig. 1. Electrode jaw is adjusted as work progresses to keep electrodes on seam.

AUTOMATIC ARC WELDER—
Unusual Setup Hastens Big Welding Jobs

By WILLIAM H. QUASEBARTH, Plant Engineer, Atlas Machine & Iron Works, Arlington, Va.

TO MEET FABRICATING requirements created by the rapidly increasing trend to welded plate girder construction for bridges and other structures, the Atlas Machine and Iron Works, Arlington, Virginia, has installed an unusual automatic submerged arc welding setup. The equipment handles girders up to 100 ft in length and almost any width or height and weight likely to be required in the area served.

A Lincoln Electric Twin-Arc automatic submerged arc head feeds two wires in tandem arrangement and through a single jaw. Two 750-ampere motor generators supply current. This equipment produces unusually heavy submerged arc weld beads in single passes and at high speed. With the high current density applied, maximum penetration is attained. Two 3/32-in. mild steel (L-60) electrode wires are fed automatically and simultaneously along with an agglomerated mild steel flux (Number 780) in ample volume to keep the twin arcs covered.

To produce long welds, such as those for joining girder web plates to flanges, after these components have been tack welded in proper relative position, the tacked assembly is placed against a row of angle supports. These supports are inclined at a 45-deg angle and are in two rows, one along the wall and a parallel one at the opposite side of a 90-ft track along which a carriage is advanced at whatever welding speed is set.

On this carriage, is a Herrick fixture with a horizontal boom that can be adjusted longitudinally and

for height. It can also be swung about the vertical support, which is pivoted on a pedestal attached to the carriage. At one end of the boom is a vertically adjustable support for the automatic head with its flux hopper, control panel, wire feed and other accessories. From the head a tube for flux and wire extends to the gun to which leads for current supply are attached.

At the opposite end of the boom are two reels of wire that feed through a horizontal insulated tube and then, via a vertical tube, to the head. On the boom, there is also a large flux hopper from which the head hopper is refilled via a valve, as needed. Attached to the floor of the car, are the two motor generators, a vacuum unit with hose for flux recovery and a box for collected flux that is separated from large slag particles by a shaker screen. The carriage includes its own variable speed transverse motor for advance at the welding speed set.

Instead of using long flexible cables for power supply to the carriage and generator motors, a conduit holding three aluminum angles that serve as bus bars is laid between the tracks. Bearing in the V of each angle is a sliding shoe pressed downward by springs and connected by a plate to a flexible cable extending to the main distribution panel on the carriage. An insulated plate extending from the carriage to each shoe passes through a slot between flexible rubber strips that constitute the top wall of the conduit.

This permits the plates to move along with the carriage and yet to keep the necessary contact with the shoe below the covering. As the latter is flexible, the slots close behind the plates as they advance, keeping dirt or metal particles from entering the conduit.

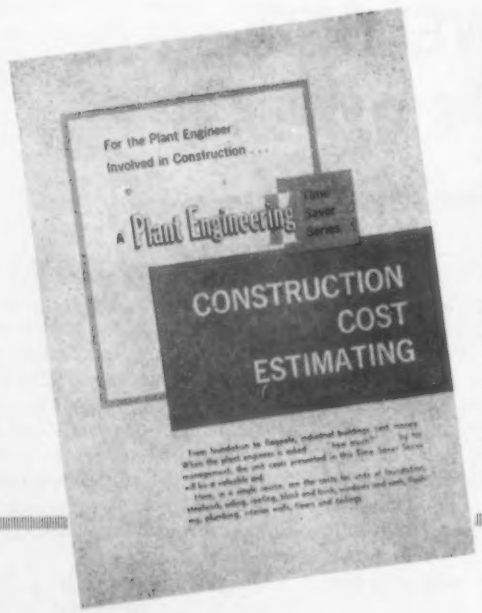
This rubber top also constitutes an insulation and is so supported that anyone stepping on the conduit is not subjected to contact with the conductors that carry three-phase, 220 v power supply. Each bus bar is connected by cable in a transverse floor conduit running below the track to the main wall switch. Paralleling the track and between the two rails is a grounded copper bus bar against which a wheel on the carriage rolls and conducts ground return current.

With this arrangement, the operator of the welder, who keeps it adjusted to follow the required path, as in Figure A, moves along with the welding head and always has it under his control. A vacuum hose is used to pick up excess flux after it has cooled.

Typical of work done on girders is welding a ⅜-in. web plate to a 1-in. flange plate, producing a 5/16-in. fillet weld at the rate of about 33 ipm. In such welds, 525 amperes are fed to each of the two 3/32 in. wires, or a total of 1050 amperes to the arc. Welds produced are uniform and comparatively smooth. Fused flux either curls up as it cools or is chipped away very easily.

After the fillet weld on one side of the web is completed, the girder usually is shifted by the shop crane to the support bed at the opposite side of the track, the carriage being moved out of the way temporarily. Then the same setup is used to produce the fillet on the other side of the web.

In some setups, top and bottom flanges are the same, but usually the lower one is heavier because of its tension load. In certain cases, the bottom flange is made thicker for a distance at each side of the center of the girder and then is flame cut to a taper and beveled for transverse welding to a thinner plate that also is welded (longitudinally) to the girder flange. Top flanges also are varied to meet specifications. **End**



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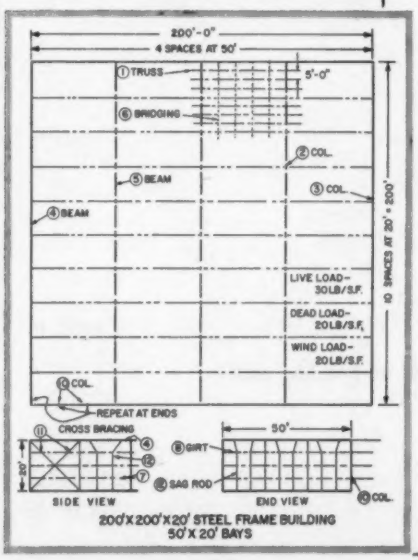
CONSTRUCTION COST ESTIMATING PART 3

STEEL BUILDINGS

Use of the sample calculations presented on these pages will facilitate the figuring of the pounds of steel required for any size of building.

Always use standard shapes; when special shapes are used, not only are they more expensive, but they are more difficult to obtain. The price of the building varies directly with the column spacing. Fifty-foot bay widths require fewer foundations than twenty-foot bay widths; however, the cost of the foundations will be approximately the same. That is, a large foundation will cost more than twice as much as two smaller ones.

After the weight of the steel has been determined, your local fabricator can supply the price per ton, erected. This erected price of steel depends upon supply and demand; within the last year, the price of steel set in place has varied between $330.00 and $240.00 per ton.



200'X200'X20' STEEL FRAME BUILDING
50'X20' BAYS

The following calculations are required to compute the steel needed in a 200-by 200-by 20-ft steel frame building, designed for a 30-lb live load and a 20-lb dead load on the roof. Wind load is 20 lb per sq ft.

Dead load consists of:

4-ply built up roofing	6.4 lb
10-in. insulation	1.4 lb
22-ga. steel decking	1.85
Trusses	4.60
	14.25 lb per sq ft

Reference numbers on the sketch refer to these items:

1. Truss. 5-ft spacing, 50 lb per sq ft = 250 lb per lin. ft.
   From joist handbook, use a 32L08 truss, 23 lb per ft
   Weight of truss = 23×50 = 1150 lb
   41 trusses in 200-ft length, and 4 bays
   $1150 \times 41 \times 4$ = 188,600 lb
2. Columns. Inside columns support 50-ft by 20-ft area
   At 50 lb per sq ft; 50,000 lb.
   From AISC handbook, use an 8WF31 shape
   31 lb × 20 ft = 620 lb per column. 11 columns per row, 3 rows;
   33×620 = 20,460 lb
3. Columns. Outside columns support 25-ft by 20-ft area
   At 50 lb per sq ft; 25,000 lb.
   From handbook, use 8WF24 shape.
   These columns have a combined wind and roof load.

$$f = 17{,}000 - .485\frac{l^2}{r^2} = 17{,}000 - .485\frac{(20\times 12)^2}{(1.61)^2} = 6200 \text{ lb per sq in.}$$

Column loading in lb = area × f. Therefore, area = $\frac{P}{f}$

Beam loading $S = \frac{M_c}{I}$ Area = $\frac{I}{r^2}$ Therefore, area = $\frac{M_c}{Sr^2}$

The outside column has a combined load so that

$$\text{Area} = \frac{P}{f} = \frac{\text{moment} \times \frac{\text{beam depth}}{2}}{20000\ r^2}$$

Moment for uniformly loaded beam = $\frac{Wl}{8}$

$$= \frac{20 \times 20 \times 20 \times 20 \times 12}{8} = 240{,}000 \text{ ft-lb}$$

When column has combined roof and wind load, stress can be increased 1.5 times.

$$\text{Area} = \frac{25000}{6200 \times 1.5} + \frac{240{,}000 \times \frac{8}{2}}{20{,}000 \times 1.5 \times (3.42)^2}$$

$$= 2.69 + 2.73 = 5.42 \text{ sq in.}$$

Actual area of 8WF24 = 7.06 sq in.
Weight per column = 20 ft × 24 lb = 480 lb
11 columns per row; 2 rows. 22×480 = 10,560 lb

STEEL BUILDINGS . . . .

1. Truss. 188,600 lb

2. Columns, inside. 20,460 lb

3. Columns, outside. 10,560 lb

4. Beam. Outside of building, supports 25,000 lb.
   From handbook, use 14WF30 shape. 20 ft. × 30 lb per ft = 600 lb per beam
   10 beams per row, 2 rows. 20 × 600 12,000 lb

5. Beam. Inside of building, supports 50,000 lb.
   From handbook, use 16WF50 shape. 20 ft × 50 lb per ft = 1000 lb per beam
   10 beams per row, 3 rows. 30 × 1000 30,000 lb

6. Bridging. Joist bridging, 10-ft centers. Use 2 x 2 x ¼ angle.
   5.66 ft long, 3.19 lb per ft = 18 lb.
   2 pairs of angles per bridge, 4 bridges per truss = 144 lb per truss.
   40 spaces × 4 bays = 160 × 144 23,040 lb

7. Girts. 5-ft spacing. Load on girt = 5 ft × 20 ft × 20 lb wind load = 2000 lb or 2 kips.
   $M = \frac{WL}{8} = \frac{2 \times 20}{8} = 5$. Section Modulus = 5 × 0.6 = 3
   From handbook, use an 8[]11.5 shape. 20 ft × 11.5 lb per ft × 230 lb per girt
   3 girts per 20 ft; 30 per side × 2 = 60 × 230 13,800 lb

8. Girts. End of building. 5-ft spacing. Load on girt = 5 × 16.6 × 20 = 1660 lb.
   $M = \frac{WL}{8} = \frac{1.66 \times 16.6}{8} = 3.48; \frac{I}{c} = 3.48 \times 0.6 = 2.08$
   From handbook, use a 7[]9.8 shape. 16.6 ft × 9.8 lb per ft = 163 lb per girt.
   9 girts per bay, 8 bays = 72 girts. 72 × 163 11,736 lb

9. Angle iron. At ground; 4 x 3 x ¼ angle, at 5.8 lb per ft.
   Perimeter of building, 800 ft; 800 × 5.8 4640 lb

10. Columns. End of building. Wind load on column =
    16.6 ft × 20 ft × 20 lb = 6700 lb
    $M = \frac{WL}{8} = \frac{6.7 \times 20}{8} = 16.78; \frac{I}{c} = 16.78 \times 0.6 = 10.08$
    From handbook, use an 8WF24 shape. 20 ft ×24 lb per ft =
    480 lb per column. 16 col × 480 7680 lb

11. X Bracing. Braces 28 ft long, 3 on each side of building.
    $r = \frac{l}{300} = \frac{28 \times 12}{300} = 1.2$
    From handbook, use 4 x 4 x ¼ angle, 6.6 lb per ft
    6.6 x 28 ft = 185 lb per brace
    2 braces per panel = 370 lb per panel; 6 panels, 2220 lb

12. Sag Rods. Every 5 ft; 9 per panel on building side; 6 per panel on building ends.
    Total number of rods = 20 × 9 + 18 × 8 =324
    Use ⅝-in. rod, each 5 ft long, 1.04 lb per ft; 324 rods, 1685 lb

Total weight of steel for 40,000-sq ft building 326,421 lb
Weight of steel per sq ft of building 8.16 lb

For the same building, 200 by 200 by 20 ft, changes in the bay sizes produce these values:

Bays 50 ft by 40 ft

1. Trusses. 164 32L08 (same as 50 x 20)	188,600 lb
2. Columns, inside. 18 8WF35	12,600
3. Columns, outside. 22 8WF24 (same)	10,560
4. Beams, outside. 20 14WF30 (same)	12,000
5. Beams, inside. 15 30WF108	64,800
6. Bridging. 144 lb per truss (same)	23,040
7. Girts, side. 60 8[]11.5 (same)	13,800
8. Girts, end. 72 7[]9.8 (same)	11,736
9. Angle at bottom. 800 ft (same)	4,640
10. Columns, end of bldg. 8WF24 (same)	7,680
11. X bracing. 336 ft (same)	2,220
12. Sag rods. 324 5-ft rods (same)	1,685
Total weight of steel	353,361 lb
Pounds of steel per sq ft of building	8.83 lb

Bays 40 ft by 20 ft

1. Trusses. 205 24L04	131,200 lb
2. Columns, inside. 44 8WF24	21,120
3. Columns, outside. 22 8WF24	10,560
4. Beams, outside. 20 12WF27	10,800
5. Beams, inside. 40 16WF40	32,000
6. Bridging. 3 per truss	21,600
7. Girts, side. 8[]11.5 (same)	13,800
8. Girts, end. 8[]11.5	13,800
9. Angle at bottom. 800 ft. (same)	4,640
10. Columns, end of building. 10 8WF24	4,800
11. X bracing. 336 ft (same)	2,220
12. Sag rods. 360 5-ft rods	1,872
Total weight of steel	268,412 lb
Pounds of steel per sq ft of building	6.71 lb

Bays 50 ft by 50 ft

1. Trusses. 164 32L08 (same)	188,600 lb
2. Columns, inside. 15 10WF45	13,500
3. Columns, outside. 22 8WF24 (same)	10,560
4. Beams, outside. 20 14WF30 (same)	12,000
5. Beams, inside. 12 36WF150	90,000
6. Bridging. 144 lb. per truss (same)	23,040
7. Girts, side. 60 8[]11.5 (same)	13,800
8. Girts, end. 72 7[]9.8 (same)	11,736
9. Angle at bottom. 800 ft (same)	4,640
10. Columns, end of bldg. 8WF24 (same)	7,680
11. X bracing. 336 ft (same)	2,220
12. Sag rods. 324 5-ft rods (same)	1,685
Total weight of steel	379,461 lb
Pounds of steel per sq ft of building	9.48 lb

Bays 40 ft by 40 ft

1. Trusses. 205 24L04	131,200 lb
2. Columns, inside. 24 8WF31	14,880
3. Columns, outside. 22 8WF24	10,560
4. Beams, outside. 20 12WF27 (same)	10,800
5. Beams, inside. 20 27WF94	75,200
6. Bridging. 3 per truss (same)	21,600
7. Girts, side. 8[]11.5 (same)	13,800
8. Girts, end. 8[]11.5 (same)	13,800
9. Angle at bottom. 800 ft (same)	4,640
10. Columns, end of building. 10 8WF24	4,800
11. X bracing. 336 ft (same)	2,220
12. Sag rods. 360 5-ft rods	1,872
Total weight of steel	304,372 lb
Pounds of steel per sq ft of building	7.61 lb

The amount of steel required for any size of building can be obtained by multiplying the following factors times the number of bays in the proposed building. These factors represent several possible bay sizes, as shown, and are figured for a 20-ft-high building. For an 18-ft-high building, reduce the amount of steel by 1 per cent. To identify the areas, see sketch on following page.

	50 x 20	50 x 40	50 x 50	40 x 20	40 x 40
CORNER	11.997	10.414	10.42	10.90	9.46
SIDE	7.919	8.383	8.77	6.88	7.45
END	10.429	9.533	10.05	7.85	8.26
INNER BAY	6.796	7.686	8.52	5.45	6.45

Example: 400 ft by 400 ft by 20 ft building, 50 x 20 bays

4 corners	50 x 20 x 4 = 4000 sq ft	x 11.997 =	47,988 lb
36 sides	50 x 20 x 36 = 36,000 sq ft	x 7.919 =	285,084
12 ends	50 x 20 x 12 = 12,000 sq ft	x 10.429 =	125,148
108 inner bays	50 x 20 x 108 = 108,000 sq ft	x 6.796 =	733,968
160 bays			1,192,188 lb

STEEL BUILDINGS .

Steel required for various building areas is shown below. Areas are identified in sketch, bottom right.

Corner A

5 trusses 1150 x 5	5750 lb
2 columns 8WF31	1240
2 columns 8WF 24	960
Side girts 230 x 3	690
End girts 163 x 9	1467
End columns 480 x 2	960
Angle 70 ft x 5.8	406
Sag rods 15 ft x 5.2	78
X bracing	360
Bridging 144 x 4	576
Beam, outside	600
Beam, inside	1000
Total weight	14,087 lb

Corner B

5 trusses	5750 lb
2 columns 8WF24	960
Side girts	690
End girts	1467
End columns	960
Angle	406
Sag rods	78
X bracing	360
Bridging	576
Beam, outside	600
Total weight	11,847 lb

Corner C

4 trusses 1150 x 4	4600 lb
1 column 8WF24	480
1 column 8WF31	620
Side girts 3 x 230	690
End girts 163 x 9	1467
End columns 480 x 2	960
Angle	406
Sag rods	78
X bracing	360
Bridging	576
Beam, outside	600
Beam, inside	1000
Total weight	11,837 lb

Corner D

4 trusses	4600 lb
1 column 8WF24	480
Side girts	690
End girts	1467
End columns	960
Angle	406
Sag rods	78
X bracing	360
Bridging	576
Beam, outside	600
Total weight	10,217 lb

Average pounds of steel, corner = 11.997 lb per sq ft

Inside bay

4 trusses 1150 x 4	4600 lb
1 column 8WF31	620
Bridging	576
Beam, inside	1000
Total weight	6796 lb

Ave. pounds of steel, inside bay = 6.796 lb per sq ft

Side E

4 trusses 1150 x 4	4600 lb
1 column 8WF24	480
1 column 8WF31	620
Side girts 3 x 230	690
Angle 20 ft	116
Sag rods 9 x 5.2	47
Bridging 144 x 4	576
Beam, outside	600
Beam, inside	1000
Total weight	8729 lb

Side F

4 trusses	4600 lb
1 column	480
Side girts	690
Angle	116
Sag rods	47
Bridging	576
Beam, outside	600
Total weight	7109 lb

Average pounds of steel, side = 7.919 lb per sq ft

End G

5 trusses 1150 x 5	5750 lb
2 columns 8WF31	1240
End girts 163 x 9	1467
End columns	960
Angle	290
Sag rods	31
Bridging	576
Beam, inside	1000
Total weight	11,314 lb

End H

4 trusses	4600 lb
1 column 8WF31	620
End girts	1467
End columns	960
Angle	290
Sag rods	31
Bridging	576
Beam, inside	1000
Total weight	9544 lb

Average pounds of steel, end = 10.429 lb per sq ft

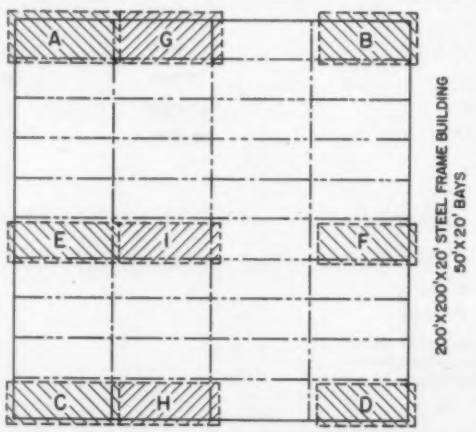


Fig. 1. Problem of lack of work space was licked by positioning a small lathe under the fan shaft for machining operation.

FAN SHAFT REPAIRED IN PLACE

Low-geared motor, lathe, metallizing help simplify a tricky job at Martin Company

By ADAM SCEPANIAK, General Foreman, Plant Maintenance, The Martin Co., Baltimore, Md.

THE DIFFICULTIES involved in repairing shafts on air supply fans without tearing down the concrete-block walls that enclosed them, were overcome at our plant by ingenious use of a small lathe and metal spray to repair the shafts in place. By doing this, we saved more than $4400 on each repair bill.

These air supply fans, which distribute heat in the winter and circulate air in the summer, run

almost continuously. The shafts, which drive these fans to an output of 80,000 cfm, are 12 ft long and 5 in. in diameter and are undercut to 3-3/16 in. on each side of the impeller for bearing surface. One end of the shaft is coupled to a 50-hp electric motor and the other end to a small fan which provides induced draft for the furnace.

In spite of preventive maintenance these shafts become worn and pitted from vibration and the high humidity of the return air.

When the first bearings wore out, the maintenance department was faced with a problem. The fan rooms are enclosed with concrete-block walls and the door is not large enough to permit removal of the shaft and large impeller. This left the choice between two solutions —replace the bearing without repairing the worn shaft or tear a wall out and remove the shaft for repairing. But when it was determined the length of time it would take to tear the wall down and make the repair with the subsequent interruption to production, it was decided to replace the bearing only until a cheaper and less disruptive method could be devised.

It was recognized, of course, that the bearing would last only a short time on the damaged shaft, so plans were immediately made to find a method of repairing the shaft.

By the time the bearings needed replacing again the maintenance department had devised a way of repairing the worn shaft. This is how: A small lathe is positioned under the shaft making it possible to machine the worn section with the shaft remaining in place. The 50-hp motor used to drive the fan shaft is removed and replaced by a low-geared motor for turning the shaft and the lathe. The worn part of the shaft is machined to a depth of 3/16 in. by 6 in. long.

The machined section is then built up to 3¼ in. with metal spray after which it is machined to its original size of 3-3/16 in. The metal spray is stainless steel which provides a hard rust-resistant surface. The final finish is obtained by attaching a grinder to the carriage lathe.

The entire operation required the expenditure of $180 for labor and material. To have torn down the wall and removed and replaced the shaft would have cost $4600. **End**

Fig. 3. Machined area is finally built up with metal spray stainless steel wire.

Fig. 2. Motor which normally drives fan shaft was replaced by a motor geared down to drive both lathe and shaft.

How To Simplify Layout of

LOCKER AND SHOWER FACILITIES

Preliminary planning, setting up code requirements, and standardizing on fixtures can save many steps

By F. JOHN EGGERT, Mechanical Engineer, Hamburg, N. Y.

SOMETIME, SOME DAY you will probably have to approve a preliminary layout for another locker and shower room. Few decisions will have as much influence on the future cost of its function as will the degree of utility that is incorporated into the preliminary layout.

Accordingly, this discussion is intended to pinpoint alterations to consider when examining a routinely prepared layout drawing.

Experience Sets Pattern

As evidence of its recurrence as a plant engineering problem, a large industrial plant with which the author is quite familiar has more than 185 separate locker and shower rooms. Naturally some preference for certain layout features would be evolved after the construction and operation of such a quantity of units over the years. This is especially true when designs are intended to increase utility of the rooms and to reduce the cost of maintenance.

There are multiple advantages to a good preliminary layout. For example, it has been found that providing a garden hose to rinse down floors is superior to the old mop and bucket method. Unit heaters—steam, electric, hot water, or gas-fired—that are suspended from the ceiling, provide open and cleanable wall space. Of course, they should be positioned to blow toward the door in the vestibule. Barriers are

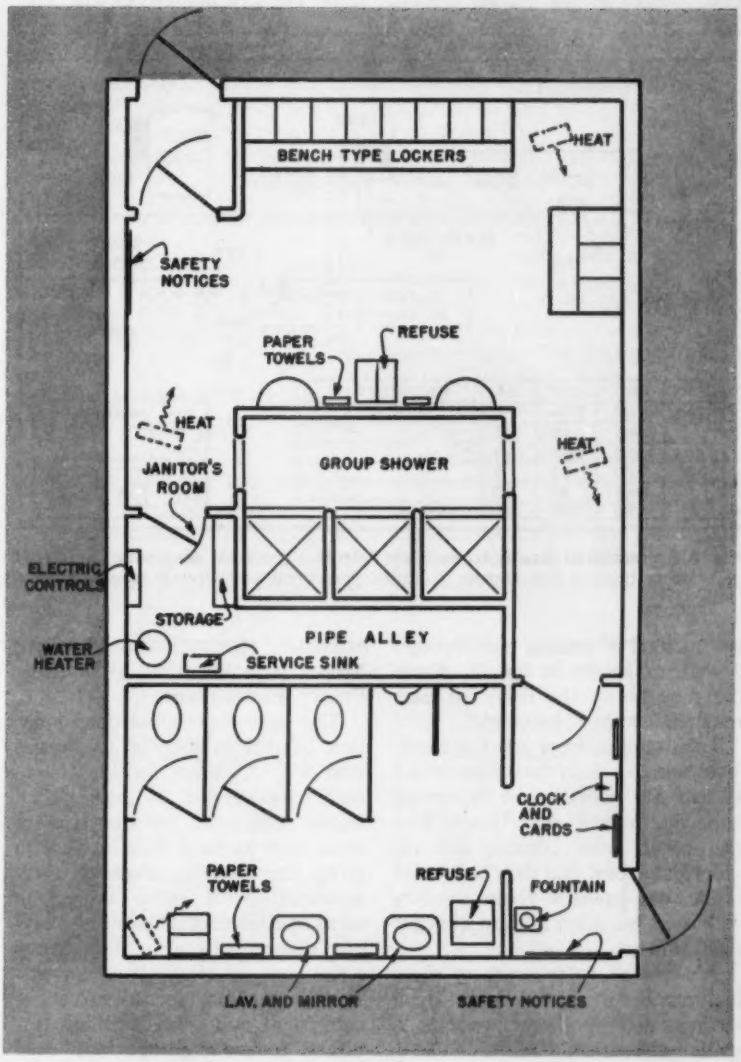


Fig. 1. Preplanned layout is important in any washroom arrangement. Routing the pipe through a central alley, above the floor, will simplify maintenance.

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necessary in front of the showers in order to reduce horseplay and consequent accidents. They should also be designed to keep the water within bounds. It is this type of detail that is easily overlooked.

Similar points regarding ventilation of either floor or bench type lockers is a problem. Forced air flowing through the space under bench type lockers is not always the answer either. The method of suspending baskets on chains from the ceiling demands a room with a high ceiling. Wall-hung urinals and wall-hung closets solve the floor erosion problem by simplifying floor cleaning. Further, it is well to specify all tamper-proof fixtures or they will soon be missing.

In regard to the piping layout, one method of routing pipe through a wall, as shown in Fig. 1, places the pipe above the floor for easy maintenance in "pipe alley."

Hot water sources are numerous. The objective is to determine which system has proven best in certain applications and why. Since heat and power vent controls are required, it is best that they be located inside the janitor's room or they will soon be worn out by multiple readjustment.

We are all fully aware of these features, but the trick is to get them incorporated into any layout as a matter of routine.

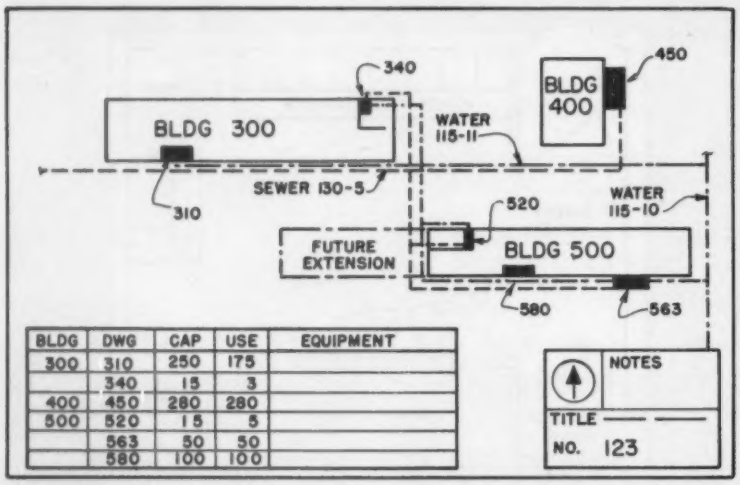
A good method of approaching this layout problem is the preparation of a map, Fig. 2, of all the existing locker and shower facilities. This drawing illustrates that general planning along with the inclusion of a tabulation of the various pieces of equipment, the number of personnel using it, and its rated capacity.

Furthermore, a general map of this type will assist in determining the location of the new locker and shower facilities by indicating the necessity for expansion of existing facilities, relocation possibilities, and coincide with a layout that anticipates future demands.

This map is also useful in selecting the most economical site in respect to the availability of water and sewer lines. Further, it facilitates the preparation of the cost estimate. (See "Industrial Plant Maps" page 90, June 1958 issue, PLANT ENGINEERING).

The next step is the determination of the number of employees who will use these facilities along with consideration of their special needs occasioned by the type of work they perform. For instance, a group employed in unusually dirty locations, or a group subject to other special conditions need a layout different from a shop group who work in relatively clean surroundings. Also, special protective equipment and other clothing furnished to some groups may need special storage facilities.

Even the best-designed layout of locker and shower room facilities is of no avail if conditions of your local sanitary code are not met. You have to comply, so why not make it easy? Accordingly, it is suggested that the governing code for your state be analyzed and digested for application in your plant. This can be done by listing the code requirements as a plant standard, including pertinent information that is applicable to your plant as the result of experience.



BLDG	DWG	CAP	USE	EQUIPMENT
300	310	250	175	
	340	15	3	
400	450	280	280	
500	520	15	5	
	563	50	50	
	580	100	100	

Fig. 2. An industrial map is an excellent reference piece for examining the layout of existing lockers and shower facilities and when considering future layouts.

Code Requirements—Plus Yours

Following is a typical example of this suggestion showing how to break down code requirements and to annotate them with pertinent suggestions.

General — Toilets and urinals should be located in a room separate, if possible, from the locker room. Each watercloset in toilet rooms containing more than one watercloset, or a watercloset together with one or more urinals, shall be in an individual compartment.

Washing Facilities—Washing facilities shall be located on the same floor as, and in proximity to, the toilet rooms. If this requirement is not practicable, at least one wash basin shall be provided in each toilet room or in close proximity thereto.

Janitor's Room—Plant practice is to provide a janitor's room. It should be supplied with a service sink and adequate storage space. General practice is to install an electrical control panel for control of lighting, ventilating fans and heater units. Include a mixing valve for cleaning the hose connections. Connections should be located for convenience and recessed in the wall.

Water Heaters — Water heaters should be located in a separate, well-ventilated room or space with outside stack where needed.

Drinking Water — An adequate supply of cold, clean and pure drinking water shall be provided so as to be readily accessible to all employees. Do not locate drinking water fountains in toilet rooms. Plant practice is to supply electrically-operated water coolers in locations convenient to employees

and to available water supply and drain connections.

Continue through your governing code or codes in this manner. Your plant standard should be appended to it along with a list of your standard fixtures, fittings and materials.

Regardless of the claims of vendors of equipment that their product design is the best in all installations, locker and shower room facilities still have to be tailor-made to suit your conditions. In regard to the selection of the make and model of equipment, the past and present performance of the equipment in use in your plant is the best criterion.

STANDARD FIXTURES AND MATERIALS

Water Closets

Vitreous china, siphon jet, top spud, 10 in. roughing, Blank make, Blank model with Blank model flush valve.

Lavatories

Enameled cast iron, 24 in. by 20 in. Blank make, Blank model, with Blank model faucets, loose key stops and 1¼ in. trap.

Service Sink

Acid-resisting, enameled cast iron, 24 in. by 20 in. Blank make, Blank model, with supply fitting and floor trap with spigot end for 3 in. C.I. soil pipe.

Wash Fountains

Blank make (list sizes) hand-controlled wash fountain, with supplies from above or below, combination spray head and soap tray, Blank finish bowl, vitreous enamel pedestal, biege color, grey scuff base and vandalproof fixtures.

Shower Fixtures

Blank make and model industrial exposed shower with Blank model shower head with volume regulator and adjustable ball joint.

Wall Tile

Glazed facing tile 5⅓ in. by 12 in. face, 2 in. by 4 in. bed depth.

Floor Tile

Vitrified, unglazed 1 in. by 1 in. by ½ in. ceramic squares.

(Continue through the regular list of materials in this manner.)

Now the preparation of a preliminary layout merely requires positioning the necessary equipment.

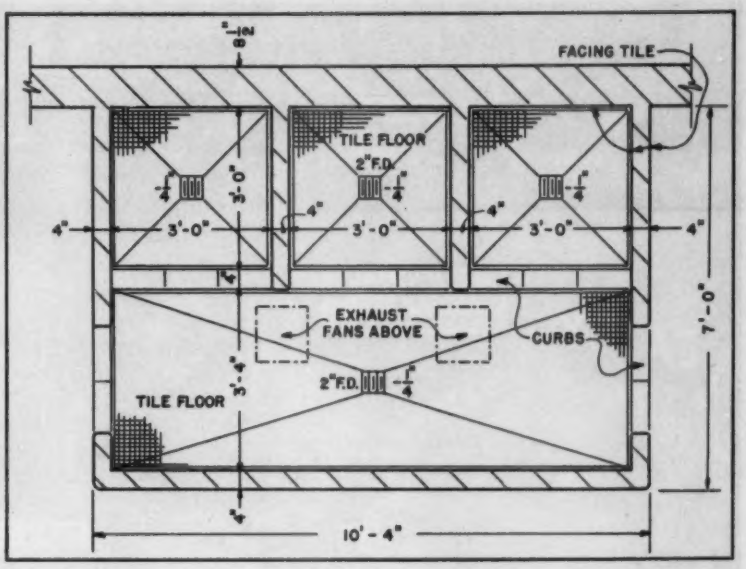


Fig. 3. Here are typical plans for the floor area coverage of single shower stalls, usually found only in Type II facilities—those serving large groups of employees.

Figure 3 furnishes the floor area coverage of typical plans for a group of shower stalls used in Type II locker and shower rooms.

Figure 4 furnishes the floor area coverage of typical plans for single shower stalls. This is the kind used in Type I facilities in private offices of foremen, and in small locker and shower rooms serving 1 to 15 men.

Variations of layout and construction methods are endless and consequently it is up to the plant engineer to lay out the locker and shower rooms strictly according to plant needs and available sites. **End**

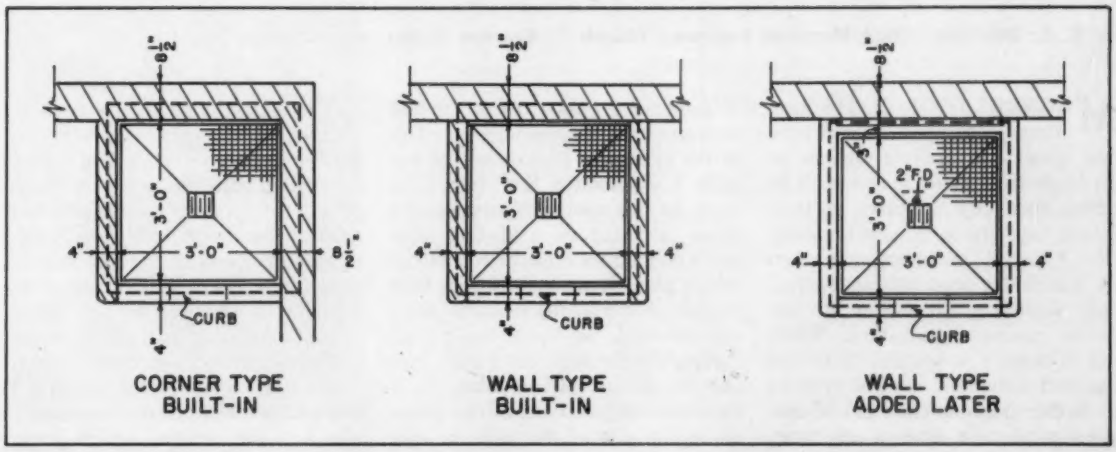


Fig. 4. These are typical floor plans for different locations of shower stalls used in Type I locker and shower rooms.

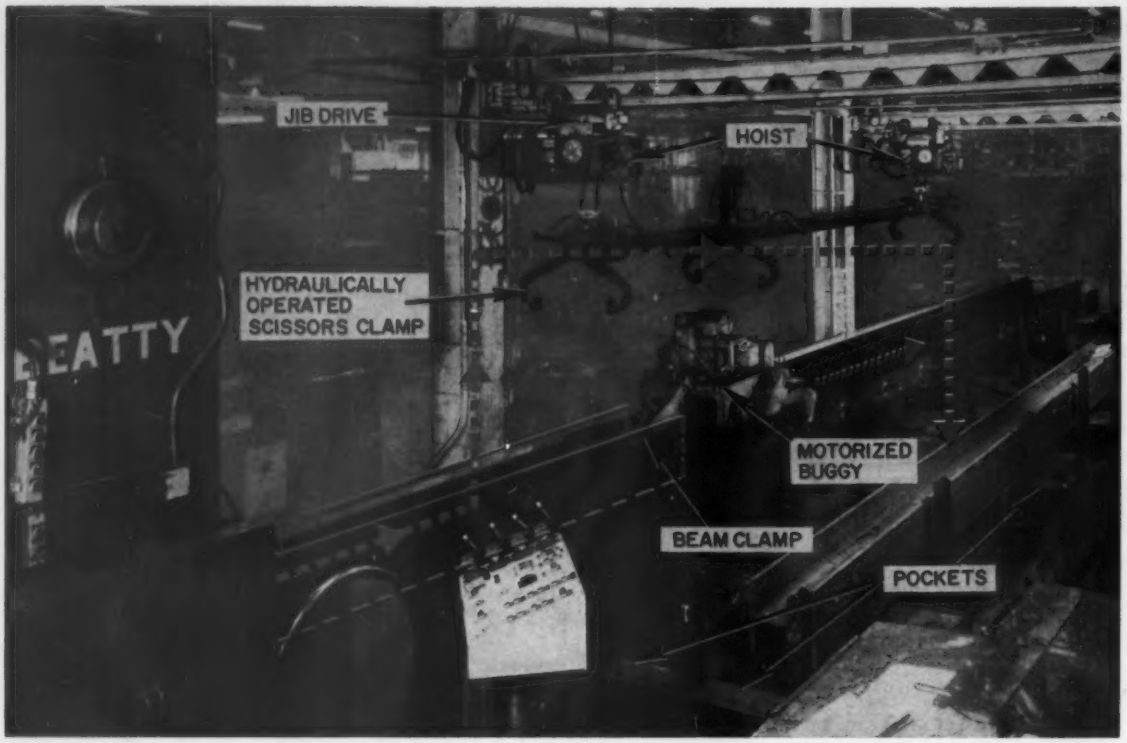


Fig. 1. Structural beam is picked up from table, dotted line, placed into selected pocket without attention from operator.

BUTTON-PUSHING JOB?

Simple Cam Control System Saves Operator's Time, Improves Machine Productivity

By R. E. INGHAM, Chief Electrical Engineer, Joseph T. Ryerson & Son, Inc., Chicago, Ill.

MACHINE TOOL COSTS have been going up at a rapid pace and direct and indirect charges of all kinds have made it necessary to utilize men and machines at their fullest capacity to remain competitive. A step in this direction is taken by completely mechanizing loading and unloading operations to improve machine utilization. When this is done, it is possible to design compact automatic control systems to further improve the ratio of machine productive time to idle time.

A good example of this method of improving operations is applied to a straight-line punching machine in the structural department of Joseph T. Ryerson & Son, Inc., Chicago. In this operation, a structural beam is placed on a loading table and clamped to a motorized buggy which pulls it through a punching station. When all the required holes are punched, the beam has passed completely through the punch and lies on the unloading table. It is then unloaded into one of five pockets at the side of the table to wait further processing.

Automatic control is used to completely eliminate operator supervision of the unloading cycle. After the punching cycle is completed, the operator presses a button marked "unload" and then walks to the other end of the machine to load the next beam. The two minute interval required for unloading is performed automatically with no further attention from the operator.

A jib crane, mounted above the unloading table, lowers hydraulically actuated scissors which grasp the punched beam and conveys it

to one of the five pockets. Heart of the automatic control system is a repeat-cycle cam timer that initiates each motion of the unloading cycle for a predetermined time interval.

In designing the automatic control system it is necessary to consider each of the steps required to unload the beam with manual control. The first operation is to release the clamp on the motorized buggy used to pull the beam through the punching cycle. When this is done, the buggy must be moved clear of the beam. The hoist carrying the hydraulically operated scissor clamp is then lowered to a position over the beam and the clamps closed to grasp the beam.

At this point the hoist raises the beam clamp vertically and then the jib drive moves it horizontally to a position over one of five pockets. When it arrives over the selected pocket, the beam is lowered until it is a few feet from the floor and the scissor clamp opens to deposit the beam in the pocket. The hoist then raises and moves back to its original position over the unloading table.

If you will count the separate operations needed to manually control this unloading operation you should come up with the figure ten, and a repeat cycle timer with ten cams was selected as the controlling medium. An extra cam on the end of the unit operates a latching relay which stops the timer after one revolution.

The cycle timer is designed so that one complete revolution of the cams takes exactly two minutes. This time is adequate to handle the speeds of the hoists and allows for the maximum time required to reach the fifth or outermost pocket. It should be noted that the two minute time is required regardless of which unloading pocket is selected. In all cases, the automatic unloading sequence is shorter than the time required to load the punch and does not delay the operation.

Each operation must occur in the correct sequence and must continue for a duration of time long enough to complete that particular step. The time sequence chart, Fig. 3, shows how this was arranged. Cam settings can be individually adjusted to allow more or less time as required.

Circuit design was carried out in three distinct steps. The first step consisted of applying the repeat cycle timer to the various motions required. This was relatively simple since all that was necessary was to wire each of the timing switches to its related motion. The second step incorporated safety limit switches to insure the completion of each step in the unloading sequence before the next step could be energized.

In the third step, provisions for switching to manual control were provided. The prime requirement in this step was to completely isolate the automatic portion of the circuit when operating on manual control. This required lock-out relays and in some cases multiple switching. Extreme care was required to eliminate any possible feedback circuits between manual and automatic operations.

Should the operator switch to manual control at any time after he has initiated the automatic sequence, the automatic unloading controls will be locked out and will not function until the cam timer has completed its rotation and the jib crane has been returned to the starting position. A pilot light on the operators control stand indicates when the timer is running.

There are several circuit refinements that would be of interest to anyone working out a similar control problem. As an example, in step T-5 the hoist motion must not be energized until the hydraulically actuated scissors clamp has firmly grasped the beam to be lifted. On the other hand, in step T-9 the hoist must not be energized until the scissors clamp has released the beam into the selected pocket.

To make sure these conditions are fulfilled, a hydraulic pressure switch is installed in the pressure line to the scissors clamp. A nor-

(Continued on page 266)

Fig. 2. Author points to cam timer controlling sequence of operations.

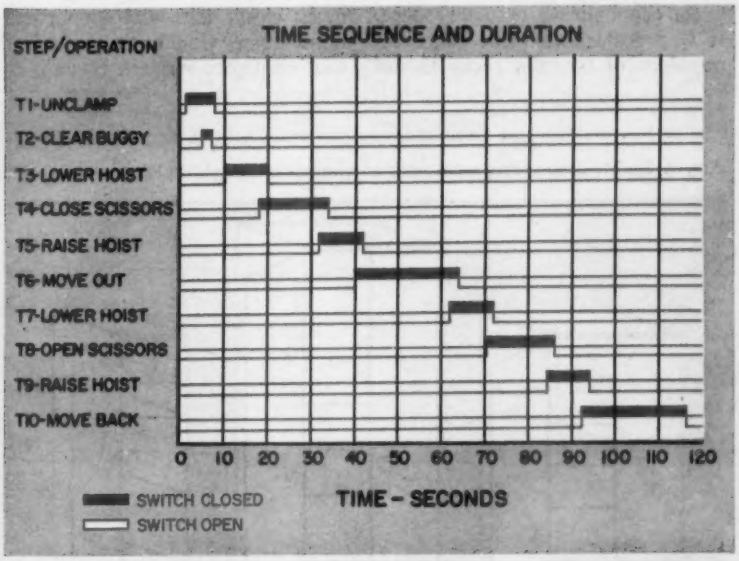


Fig. 3. Each of the ten cams closes a contact in a predetermined sequence and holds it closed for a fixed time interval to duplicate manual operating conditions.

How Western Electric TESTS AND SELECTS SHOP RACKS

By R. H. PHILLIPS, Factory Engineer, Indianapolis Works, Western Electric Co.

DURING A RECENT expansion of Western Electric's Indianapolis Works, we had an opportunity to review existing practices in our field with a view towards economy in fitting out the new plant area. Of a number of technical-economic studies undertaken, one involving shop racks well represents Western Electric's approach to evaluation of installed facilities. Basically the choice lay between continued use of Western Electric manufactured racks and the adoption of commercially available ones. We had some prior indication that purchased racks would prove more economical if properly selected.

One characteristic of our traditional racks seem to warrant evaluation at the outset. Each of the three designs shown in Fig. 1 had shelves 30 in. deep. Studies made among users of these racks revealed that the rear 6 in. of these shelves were rarely used; therefore shelves 24 in. deep would serve the purpose while economizing on floor space. It was decided that the other dimensions of the new racks should duplicate those of the traditional racks. Specifications called for a maximum loading strength of 200 lb per square foot on all shelves.

From a list drawn up by our purchasing organization, a number of rack manufacturers were selected to receive requests for quotations. Seven manufacturers responded, and the four makes which seemed most attractive, price-wise, were subjected to the program of tests outlined below. Incidentally, three of the racks tested were also chosen because the shelves clipped in place rather than being bolted. This feature is considered desirable because of the ease of adjustment and rapidity of assembly.

Load Tests

Zinc billets were used as the shelving test load in all of the racks as shown in Fig. 2. While this does not give an evenly distributed load in the true sense of the word, we feel that this test loading comes much closer to actual shop conditions than would truly uniform loading. Other Western Electric engineers had conducted tests of the up-rights, or posts, several years earlier. These tests were conducted on a 2-ft length of post: they failed by buckling under compressive loads ranging from 13,000 to 24,000 lbs. Results of shelf loading tests are shown in Fig. 3. Chart, Fig. 4, measures permanent set.

Assembly-Disassembly Test

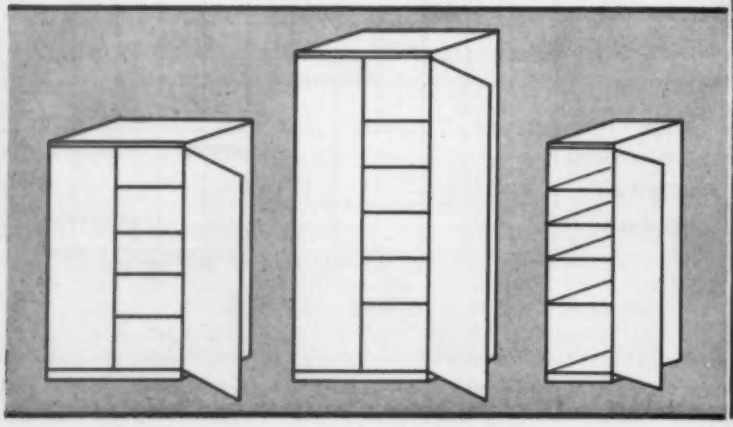
Time and labor requirements to assemble and disassemble the racks were determined with two men working, deducting time for interruptions. The men were familiar with shop practices and methods used to assemble racks but they had no specific experience with the particular racks under test. These results are shown in Table I.

Security: If security problems are encountered, bolted racks seem to be more secure from "break-in" attempts than do other types.

Rigidity: When a single rack stands alone, rigidity becomes an important consideration. Both of these characteristics are admittedly evaluated only by judgment.

Fig. 1. Below: These are three basic types of racks used by author's plant.

Fig. 2. Right: Zinc-billets were used to test racks' weight-holding ability.



The costs and technical features were considered together with the aid of the comparison shown in Table II. In this table, as in all test results shown, the manufacturers have been represented by the letters A, B, C, and F. Our final selection was the product of manufacturer F. The reasons for this selection can be summed up as follows:

1. The price of the material was the lowest.

2. The time of assembly was high but due to the low initial price the combined cost was lower than two of the other racks tested.

3. The greater time required for assembly was largely due to the number of bolts involved; however, this gives us the added feature of a safer rack from a security standpoint.

4. The load bearing characteristics were not as good as the other racks, but if difficulties are experienced the units can be strengthened with additional standard reinforcement.

5. This was the most rigid rack of the group, which is an important feature when making a single rack installation.

6. The material manufactured by Company F can be had in almost any size shelf or upright we desire, which was a feature that was not common to all racks tested.

7. When units are purchased in lots of less than 100, from manufacturer F an increase in price of only 6 per cent was added. Other manufacturers have not offered us this price feature.

With an investigation of this type, we have a useful tool for determining the merits of a wide-range of plant storage facilities. **End**

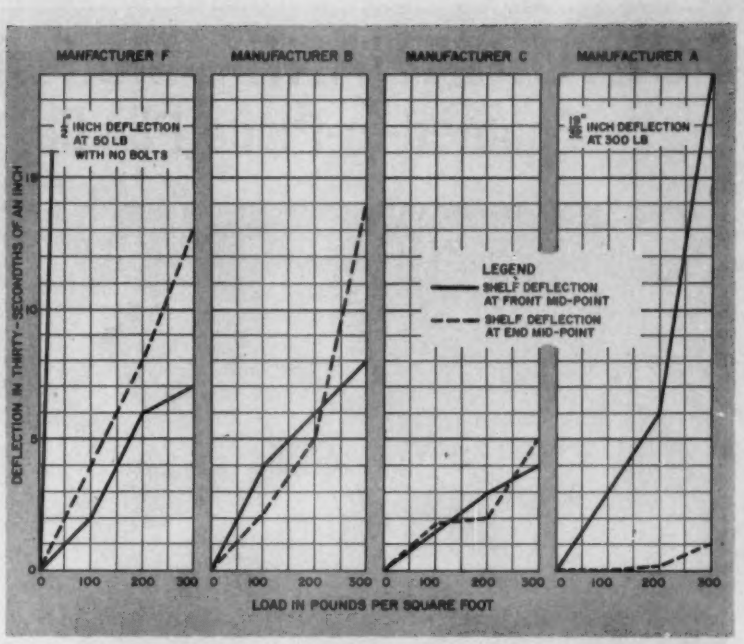

MANUFACTURER F
MANUFACTURER B
MANUFACTURER C
MANUFACTURER A
½ INCH DEFLECTION AT 50 LB WITH NO BOLTS
1/16 INCH DEFLECTION AT 300 LB
LEGEND
SHELF DEFLECTION AT FRONT MID-POINT
SHELF DEFLECTION AT END MID-POINT
DEFLECTION IN THIRTY-SECONDTHS OF AN INCH
LOAD IN POUNDS PER SQUARE FOOT

Fig. 3. Shelf deflection of racks as revealed by tests, are plotted in above charts.

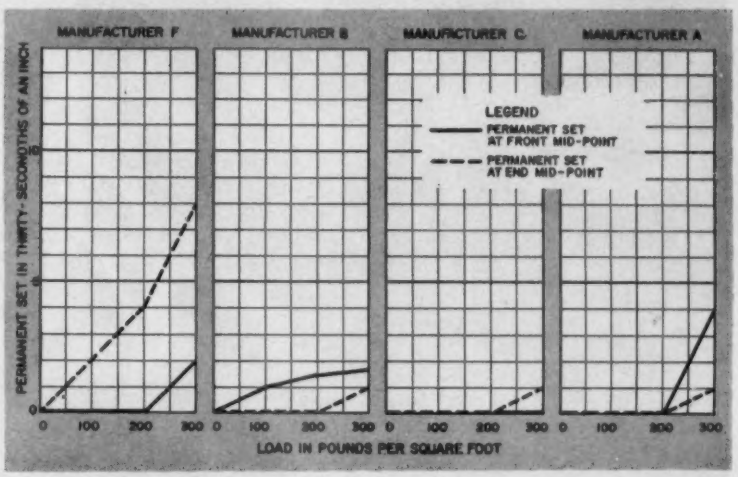


Fig. 4. Permanent "set" of shelves at front and end points are plotted here.

Table I. Labor timing for four racks.

Manufacturer	F	B	A	C
Assembly	7:10	4:20	5:38	7:00
Disassembly	3:20	1:40	2:12	2:16
Total Time	10:30	6:00	7:50	9:16

These times have been computed with two men working. All breaks and interruptions have been deducted from the times shown. The men who were timed were familiar with the shop practices and methods used to assemble racks, but they had no previous experience with any of the racks tested.

Table II. Six-point rating sheet, including total cost of four racks tested.

Manufacturer	F	B	C	A
Material Cost	1 ($42.62)	2 ($44.69)	4 ($51.50)	3 ($49.39)
Labor Cost	4 ($26.25)	1 ($15.00)	3 ($23.00)	2 ($20.00)
Total Cost	2 ($68.87)	1 ($59.69)	4 ($74.50)	3 ($69.39)
Load Characteristics at 200 Lb Per Sq Ft	4	3	2	1
Security	2	3	1	4
Rigidity	1	4	2	3
Totals	14	14	16	16

Note: In above ratings 1 equals good; 4 equals worst.

POLYURETHANE—Modern Tool

Foamed-in-Place Plastic "Fills" Many Jobs

THIS ONE: INSULATION

LITERALLY "rising" to the maintenance occasion, a versatile new plastic—foamed-in-place polyurethane, is finding application in many U. S. plants.

A liquid blend that rises like yeast, and bonds readily to steel and concrete, foamed-in-place polyurethane is used to sheath valves from corrosion, insulate plant walls, encapsulate tanks and muffle both sound and heat from engine exhausts.

Applied as a liquid, polyurethane rises to conform to the dimensions of a pipe or wall, solidifies, and thereafter may look and feel like rubber. To compound the paradox, in the process of rising, the liquid polymer is subject to an exothermic reaction, and gets hot during its usually rapid rise. Once solidified, however, the material is often as impervious to heat as it is inert to most acids and hydrocarbons. It is, in fact, an excellent insulation for exhaust pipes.

Depending on its formula, the foam can be as rigid as steel, as semi-rigid as a tire casing, or as flexible as a household sponge. Density, too, is almost completely controllable. Some foamed-in-place blends weigh more than 72 lb per cu ft; other formulas weigh only 1.5 lb per cu ft.

Some foam furiously fast—and create considerable heat and pressure in the process. Others are cool, slow risers. A few foam to 30 times their liquid volume; others expand only a third that much. Some for-

Fig. 1. To insulate freezer tunnel, foam system fills void between wall, form.

mulas realize their maximum rated tensile strength (which may range to 100 psi) only after prolonged curing at temperatures in the 100-150 F range. Others need no curing at all.

Just as varied as polyurethane's forms are its applications, plant-wise:

• At Sunkist's Lemon Products Division, in Corona, Calif., plant engineers re-insulated a 35,000 cu ft freezing tunnel—not with cork, but with foamed-in-place polyurethane.

Rather than tear down walls to replace some 14,000 board feet of deteriorated cork, engineers left standing a three-inch thick layer of cork, raised forms behind it and poured a polyurethane system into the void. Yeast-like, the liquid began to rise, foaming to a height of about 18 in. in just two minutes. Waiting 30 minutes for the foam to solidify, the engineers poured in more liquid, foaming and bonding another 18-in. increment to the first. Within a week the job was finished—in half the time required for a cork installation, and for about two-thirds its cost.

• At a west coast refinery, engineers "custom insulate" pipe valves both from corrosive elements (sea water spray) and from equally corrosive chemicals. Rigging a portable form around a complex valve, they pour in a cupful of liquid polyurethane. Rising quickly to conform to mold and valve, the synthetic insulation girds the fitting in a snug, customized jacket.

"Five minutes," says one maintenance engineer, "and a valve's corrosion-proofed . . . is sheathed in a foamed-to-fit, lightweight, rubber-like jacket. It'd take ten times as long to apply any other type of protection and the results wouldn't be as customized, as snug nor as long-lived."

For more than two years now, engineers have been putting polyurethane to maintenance uses. According to one plant engineer, polyurethane is a remarkable new maintenance tool, and among the most versatile. In his plant, they foam-in-place insulating moisture barriers around delicate electrical circuits. All that's required is the simplest

Fig. 2. Mixing machines supplied polyurethane system to "guns" through hoses.

of forms and maybe a cupful of the liquid blend . . . ten minutes later six inches of insulation is bonded around an electrical control.

• In yet another plant, engineers are literally encapsulating volatile liquids (including corrosive chemicals) in foamy synthetic. A form is rigged around small chemical tanks, the liquid poured in—and within minutes the tank is encased in plastic. Even if a leak should occur, the chemical is bottled up inside the inert "cocoon."

• Marine engineers, incidentally, are swathing fuel tanks in polyurethane foam, both to protect against fuel leaks and to act as a flotation medium (with enough polyurethane foam bonded to its hull, a boat is practically unsinkable).

• More far-reaching, perhaps, is an experiment being carried on which bids to replace air in the tires of materials handlers. Pumped into tires under low pressure, the whitish liquid foams-in-place, completely filling the tire and bonding as

Fig. 3. Formwork supports foam-confining aluminum. Excess foam is cut away.

Fig. 4. Where cork was left intact, getting polyurethane system into void was a tight squeeze for gun and for foam.

though glued to the casing. Result: a blow-out proof tire with years' longer life (it's predicted that automotive tires will, before long, be inflated with the rubber-like plastic —the first completely blow-out proof tires to tread U. S. highways).

• For low temperature insulation, a metal-polyurethane sandwich tank is used by several missile plants engaged in annealing metals in liquid oxygen. Typically, a 12 by 5 by 5 ft tank is lined with 300 lb of foamed-in-place, 1-ft thick, 2-lb density polyurethane. Formerly, when lining with cork, the application of insulation required upwards of eight hours. Lining with polyurethane takes only 45 minutes. In addition, cork has a K factor at 70 F of 0.30, while polyurethane is rated only 0.21.

• Another of polyurethane's more interesting plant uses sees the liquid turned into a kind of maintenance machinist. Rather than machine an experimental plant fixture —the piece is contoured in Fiberglas, sprayed with a parting agent and an experimental part molded of quick-rising polyurethane foam. Necessary changes are made in the Fiberglas mold . . . and another experimental part is cast. Without costly machining, a maintenance staff can custom-make a myriad of fittings . . . working with easily-handled, easily-molded foam.

Some of the reasons for polyurethane's popularity rise are obvious: polyurethane is unusually strong for its weight, is inert to most chemicals, insulates and acts as an acoustical barrier at the same time, and bonds readily either to concrete or steel.

Typically, gasoline-type solvents and alcohols have no effect on foamed-in-place polyurethane, nor do aromatic solvents dissolve the synthetic. Though ketones swell polyurethane, and may discolor it slightly, they seem to have no other effects. Even chlorinated solvents show no tendency to dissolve the quick-rising new maintenance tool.

Although polyurethane may appear to be a first cousin to the more common foam rubbers, actually it is scarcely related. No natural latex is used in polyurethane's formulation (rather, the polymer is a chemical synthetic). When water is added to the basic formula, carbon dioxide is released, causing the liquid to foam and rise yeast-like. In the process, there's a thermal reaction —heat as well as pressure are generated as, triggered by the carbon dioxide release, the liquid begins to rise.

Unlike latex-based foam, polyurethane can be sewn. It is also flame-retardant, has great resistance to ozone and sunlight and can even be laundered and dry-cleaned.

Although even polyurethane's makers (a half dozen companies) generally concede that, price-wise, the polymer is still anything but cheap, the fact is that polyurethane is competing—and successfully—with less versatile materials.

Insulating a Freezer Wall

Recently, a west coast food plant, converting a large room to a freezer, saved half the estimated cost of tear-out and corking by foaming-in-place polyurethane insulation.

The job involved, in part, the erection of a 12x40-ft insulated wall. Contractors put the price tag at $4000, said they'd need a week to remove one face of the existing tile wall, apply insulation and retile.

Plant engineers thumbed down convention, chose a slow rising, 3-lb density polyurethane with a K factor of 0.21—a formula which generates little pressure while foaming, creates but slight exothermic reaction and requires no heat cure. Portable mixers and pumps foamed the wall in eight hours, the polyurethane bonding perfectly to interior plaster and steel, sealing

(Continued on page 266)

Fig. 5. Pressure bulges aluminum sheet; wall is straightened by shaving it.

Fig. 1. Rack in plant area contains supply of "expensed" pipe and rod for no-requisition pickup by maintenance men.

REPAIR PARTS "GIVEAWAY" PRODUCES BIG COST SAVING

By S. A. HILLIARD, Stores Supervisor, John F. Queeny Plant, Monsanto Chemical Co., St. Louis, Mo.

OPERATION OF OUR maintenance storeroom, a few years back, involved the processing of 600 to 650 requisitions per day, with an average of 2.3 items per requisition. Each requisition represented a trip to the storeroom by a mechanic or operator. The large volume of entries into our records on disbursements and receipts, as well as pricing and extending all these requisitions, was a full-time job for four clerks.

Obviously, the point had been reached where reduction of paper work and reduction of mechanics' time spent in storeroom trips had to be made the object of concerted effort.

A study showed that a great deal of time was being spent on low-value, fast-moving materials. As a start in our cost-reduction program, we set up a program of charging some of these low-value items to a special account number when they were received, and discontinuing the keeping of perpetual inventory records on them.

As a first step, we charged to this special account all steel machine bolts, nuts and washers. These items were put in bins on the outside of the storeroom counter area, for self service. No requisitions were required and it was not necessary for storeroom attendants to fill these orders or for the clerks to record them. This first step reduced cleri-

cal entries by 20 per cent . . . but did not reduce trips to the storeroom.

As our second step in the program, we added all iron pipe fittings, through two-inch, to our expensed item list; this reduced entries to our records by another 30 per cent.

Storage Bins Put In Plant

To approach the reduction of trips to the storeroom, we conducted a study of the most active items in our inventory. These items were placed in Roto-Bins (a lazy-susan type of shelving) in the shop area and in the primary maintenance areas in the plant. Deliveries to these storage units were set up on a weekly schedule, to keep a supply of parts available for ready access by the maintenance men.

This parts delivery program reduced trips to the storeroom by 30 per cent—a potential saving of travel time by mechanics of 66 hours per day, or more than $150.00 per year per man.

The third step in our program was the inclusion of all iron pipe through three-inch, and all flat, round and angle iron. These items were stored in a rack at the main shop area, where 90 per cent of them were being used. See Fig. 1. This reduced entries in the inventory records 14 per cent, and trimmed 30 off the number of daily trips to the storeroom.

Incidentally, we didn't hire a man to count the trips to the storeroom . . . a simple electric eye counter was installed at the storeroom door to do that job.

After the third step, we took time to evaluate our accomplishments to date in the reduction of paper work, and more important, in reduction of trips to the storeroom by high-priced mechanics. The results were gratifying . . . average trips per day and requisitions processed had been cut from 650 to 350; items per requisition had been reduced from 2.3 to 1.7. Percentagewise, we had reduced trips and travel time by approximately 45 per cent and entries to our inventory records by 65 per cent.

Fourth step in the program was the installation of a delivery system directly to departments or jobs, as requirements dictated. A storeroom attendant was assigned to receive orders on the telephone, for delivery into the plant on an hourly schedule. To date, this innovation has reduced trips to the storeroom to less than 300 per day. Our immediate goal is to reduce this number to a maximum of 200.

These are "expensed" . . .

All black iron pipe fittings
1/8-in. through 6 in.
All galvanized pipe fittings
1/8-in. through 6 in.
All brass pipe fittings
1/8-in. through 6 in.
All iron, steel machine bolts
All iron and steel hex nuts
All iron and steel washers
Some brass screws, nuts, washers
All steel pipe
1/8-in. through 3 in.
Sand and gravel
Oxygen and acetylene
Some welding fittings
Miscellaneous hardware fittings
Paper towels, toilet tissue
Miscellaneous electrical items
Fittings, wire, lamps
All flat, round and angle iron
Miscellaneous instrument parts

Fig. 2. Pipe fittings, small hardware items are stored in Roto-Bins in 10 locations.

As the result of a recent analysis of material turnover, we have added 17 items of tubing fittings (those most active) and one size of copper tubing (used for steam tracing) to the serve-yourself racks. It is estimated that this addition will reduce trips to the storeroom by 20 to 30 per day.

Handling Telephone Orders

When an order is received by telephone, a regular stores requisition is prepared in duplicate. The order is filled by an attendant and identified by the duplicate order copy, which also shows delivery point. The duplicate copy stays with the material, when it is delivered on the battery-powered cart that has been provided for this purpose.

Although our primary goal for the program was the reduction of maintenance costs within the plant,

REPAIR PARTS "GIVEAWAY"

we find two additional benefits; the reduced paper work required in the storeroom has freed two clerks for other duties in the plant, and the reduced activity at the storeroom counter has made possible the installation of our delivery service with no increase in personnel.

At this time, the expensed items program includes 11 per cent of the total items stocked, representing approximately 13 per cent of our total monthly disbursements. Materials charged to this account are prorated as an overhead charge to individual jobs and departments at the end of each month.

We currently are working with 10 storage locations for expensed material in the plant, including two main shops. Each of these locations accommodates an area of approximately three to four acres, with some overlapping of plant areas. The storeroom itself is located at the south edge of the plant, with twenty minutes the average time required to go to the storeroom and return to the job.

Fig. 3. Electric eye was installed to verify reduction of trips to storeroom by mechanics. Here, eye "catches" entry of mechanic, operates counter in office.

The savings in walking time of mechanics from their jobs to the storeroom and back again, to pick up the relatively low-value items now available near the jobsite, plus the delivery system savings, will more than equal the total cost of operating the Stores Department at the Queeny Plant. **End**

"KNOW HOW" CAMPAIGN PROMOTES SAFETY

LAST YEAR Allis-Chalmers initiated a safety campaign which was instrumental in posting a new low accident frequency rate of 4.0.

An adaptation from the United States Steel Corp., the "Knowing's Not Enough" campaign, was carried to employees through meetings; a half-hour safety film with opening remarks by R. S. Stevenson, Allis-Chalmers president; a direct mail campaign; decals for hard hats and power tools; and posters and banners displayed in strategic spots.

This year, as a follow-through, the company is tying down its "Use Your Know How" message to specific plant experiences applied to different situations.

Safe practice folder series for shop and office employees is just one of many promotional tools used by Allis-Chalmers in its campaign to encourage safety.

At West Allis Works, safe practice folders are being given to employees by supervisors each month so that any questions concerning their contents can be discussed personally. Subjects covered in these folders include falls, housekeeping, material handling, hand tools, portable power tools, metal and woodworking machinery, protective equipment and safety shoes.

Paralleling the safe practice folders for the shops is a series for office employees. Some of these are on subjects applicable to both groups. These include fire prevention and extinguishment, vehicular and pedestrian traffic, and first aid principles. **End**

This building was converted for year around use as a maintenance shop by the installation of infrared heaters, arrows.

HARD-TO-HEAT BUILDING GETS INFRARED "HOTFOOT"

Gas-fired infrared heat generators turned barn-like building into useful space

WHEN Whayne Supply Company, a construction equipment distributor in Louisville, Ky., took over a display building as a repair shop in Kentucky's old State Fair Grounds, they anticipated "impossible" heating problems. The building was long and broad and had well-lit crane bays that would accommodate the huge construction equipment undergoing repairs.

The company had considered using only portable heaters of the type used at construction sites to provide limited spot heating. However, by heating with infrared rays, heating turned out to be a simple problem and far more economical than anyone anticipated.

This building had never been heated since it was used only during the Kentucky State Fair in September. Now, 14,000 sq ft of the 16,000 sq ft structure are heated by individual gas-fired infrared heat generators suspended overhead and providing direct heat where it is needed.

The remaining 2000 sq ft are completely enclosed areas heated by forced air furnaces. The company maintains a 65 degree temperature in the building at a cost of only $.242 per day per Fahrenheit degree below 65.

Drafts Are No Problem

This heating system provides comfortable working conditions in cold weather despite frequent door openings as machinery is moved in and out and despite the fact that the building was not designed to be heated. The 100 by 160-ft building has concrete walls, a steel roof, and a 4-ft ribbon of windows, totaling over 1600 sq ft of glass area, around the top. The center bay, 40 ft wide, is 20 ft high and the two side bays, 30 ft wide, are 12 ft high.

The high center bay, the large window area and high air infiltration make the building particularly difficult to heat by conventional methods. Heat loss of the warmer air in the upper regions through the windows and around window frames would be excessive and would have to be replaced continuously in order to keep lower areas warm.

Using radiant heat from infrared generators, manufactured by Perfection Industries, minimizes these losses. The radiant heat warms the floor first and the upper regions are never more than two to five degrees

warmer than air at the floor level.

Frequent door openings may remove the warmed air from the space but all the heat is not dissipated and workers do not suffer from the sudden drafts. The concrete floor continues to re-radiate warmth and since workers receive heat more from the radiant heaters and the floors than from the air itself, cold drafts do not bother them.

In an experiment made by the firm that installed the system, Olson Infra-Red Heating, Inc., doors at both ends of the center bay were opened until a thermometer held near the floor dropped from 64 to 58 F. This took 15 minutes. When the doors were closed, the 64 degree temperature was regained in one minute. Outside temperature during the test was 21 degrees.

32 Heaters—80 Rayheads

There are 24 heaters each with two rayheads and eight with four rayheads in the building. Each rayhead generates 12,000 Btuh, equivalent to 4.7 hp in energy. Each of the rayheads radiates over approximately 54 sq ft.

The units are positioned for even distribution of heat. They are mounted below cranes to avoid interference with them or overheating of crane mechanisms. They are positioned at a 20 degree angle to avoid concentration of heat that would make workers—directly under them—uncomfortable.

The 960,000 Btuh system was designed to raise indoor temperature to 65 degrees at 20 degrees outdoor temperatures. A thermostat, mounted four feet high on a wall at the center of the length of the building, and a solenoid valve at each heater, control the system.

When temperature drops below the 65 degree setting, the solenoid valves actuate to open the supply line to each heater. A pilot light ignites the flame. The solenoid valve is also controlled by a current generated in a thermocouple under the pilot. Should the pilot go out, the valve closes to prevent free escape of gas.

The solenoid valves operate from a 110-volt line. The only other connection to the unit is the gas line. They are suspended with simple angle iron mountings. The units operate on natural gas supplied by the local utility.

When the infrared units are used in weather colder than the design temperature of the installation, indoor temperature cannot be maintained at the 65 degree thermostat setting. For example, the units could be expected to maintain temperature of 45 degrees in zero weather. (In actual practice, variables such as wind and door openings have permitted a temperature greater than the 45 degree design temperature.)

However, the lower temperature is not a good measure of worker comfort. The floor, tools and machines remain warm to the touch because of the direct radiation from the heaters. Since personnel receive heat more from the floor and the heaters than from the air itself, they can be comfortable at low temperatures. The situation is comparable to that of a man who builds a bonfire in freezing weather. He is warm although the air remains cold.

Because radiant heat can be used directly in this way, the company decided that a 45 degree temperature rise would be sufficient. A 0 to 65 degree temperature rise would have required a 1,330,000 Btu system, 35 per cent larger than the system installed.

The 100 per cent combustion efficiency of the units without loss in a transmission medium is not the only reason for their economical operation. The lack of forced convection and air circulation means that heat losses through exposed walls are reduced. Losses are not increased because of temperature differential between upper and lower levels of air.

No Warm-Up Period

There is also another economical advantage in that heaters are producing to capacity almost as soon as they are turned on. Workers benefit immediately from the radiant heat produced. There need be no warm-up period in the morning.

Considering all factors, the company estimates that the system provides heat at a greater degree of efficiency in respect to worker comfort at 30 per cent less cost than any other system. Although the problem was to find a system that would provide consistent, reliable heat under difficult conditions, the company also figures that it saved money in the process. Heating cost for the 1957-1958 season, at $.566 per mcf of natural gas, was $820.07 for a 235 day season of 3383 degree days. The building was heated 24 hours per day. Cost per square foot for the season was $.056. **End**

Heating system provides comfortable working conditions in cold weather despite frequent door openings and the fact that building wasn't designed to be heated.

Editor's Report—

WORLD LIGHTING CONFERENCE—PLANT ENGINEERING IN EUROPE

Here are glimpses of new construction, materials and lighting in England, Belgium and France and a summary of international developments in plant and office lighting practices

By **VERN KEMPF, Electrical Editor, Plant Engineering**
Member, United States National Committee on Illumination
Delegate, XIV Session, International Commission on Illumination

WHAT happens when a curious editor, a former plant engineer, gets the chance to visit plants in England, Belgium and France? It is natural that each new experience be compared to practices here in America and a sharp lookout is kept for ideas that could be useful to PLANT ENGINEERING readers.

This opportunity became reality several months ago when notice was received from Washington of an appointment to serve as a delegate to the XIV session of the International Commission on Illumination to be held in Brussels June 15 to 24. Officially delegated to conferences on industrial plant and office lighting, I had the opportunity to listen to engineers from all parts of the world discuss problems of glare, comfort, illumination levels and the many other factors that enter into a well designed lighting system. Perhaps of equal importance, was the direct exposure received to all phases of plant engineering activity in various plants on the Continent.

An English engineer, Leslie R. Leworthy, District Engineer of the Ministry of Works, acted as a personal guide during my first two days in London. Mr. Leworthy has supervisory charge of plant engineering work in over 300 buildings in London and is a member of the Institute of Plant Engineers of England, a Fellow of the Royal Society of Arts, and he has the distinction of being the only member of the American Institute of Plant Engineers in England.

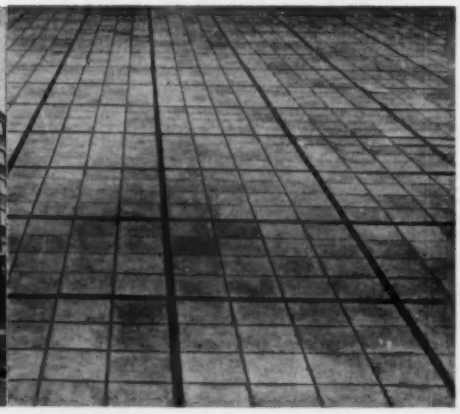
Our first stop was the National Gallery on Trafalgar Square. Here came an opportunity to see behind the scenes in this famous building, housing priceless works of art. The most important plant engineering problem in this building is protection against fire and burglary.

Fire protection must be the best and fires must be detected before they have time to do any damage. The detectors used can sense contamination of the air caused by smoldering fires. These can be located before they have a chance to generate enough heat to damage the buildings or its contents.

Fig. 1. Panel for fire and burglar detection in National Gallery, London.

Fig. 2. Modern office building has two wings meeting at common utility core.

Fig. 3. Pre-cast concrete blocks, ½ in. thick, are used on built-up roofing.



Burglar protection is also very important and the Gallery uses all of the latest radar, ultrasonic and conventional detection methods. Security regulations will not permit a full discussion of this protection system.

Both fire and burglar detection devices terminate at a central control panel, Fig. 1, where buzzers and pilot indicators both on the panel and floor plans, mounted on the wall, indicate the location of trouble. In Fig. 1, George Fox, left, of the National Gallery and Mr. Leworthy check over the log book to determine activity during the previous night.

Other plant engineering problems not apparent to the casual visitor are the control of humidity to prevent rapid deterioration of the paintings; heating, ventilating, air conditioning and lighting.

After a tour of the galleries, we motored up to Borehamwood, about 12 miles north of London, to inspect the new plant and office building of Elliot Brothers, Ltd. The office portion, Fig. 2, consists of two wings, six stories high, arranged at a 90 degree angle to each other and meeting at a common core containing the elevators, stairway and utilities. The single story plant is located in the area between the two office wings forming a very compact layout.

This building is modern in every respect, except one. The exception is the lighting system which consists of four foot strips with a single bare lamp in each. These are mounted on about 10 ft centers. Lighting levels are quite low and the glare from the exposed lamps is practically intolerable. Lighting levels in this building are probably quite satisfactory during the normal working day due to the great amount of natural daylight that can be brought in through the ample window areas.

In later discussions, it developed that lighting levels generally in England and on the Continent are not as high as we are used to and more attention is generally given to using daylighting as much as possible. The problem of direct glare from the exposed lamps still has me puzzled. It is difficult to believe that English workers have a higher tolerance to glare than we have and I found it quite uncomfortable.

The flat roof decks have pre-cast concrete tiles laid out in an attractive pattern, Fig. 3. These blocks, about one foot square, and ½ inch thick, are placed in the hot tar of the built-up roofing.

Early the next morning we drove to Greenford, about 10 miles west of London, to attend an open-air display of materials and equipment used by the building trades sponsored by the Ministry of Works.

Perhaps the most interesting exhibit was one sponsored by the Building Research Station of the Department of Scientific and Industrial Research. Here were displayed extruded perforated bricks that seemed to have a great deal of merit in simplifying brickwork and reducing costs.

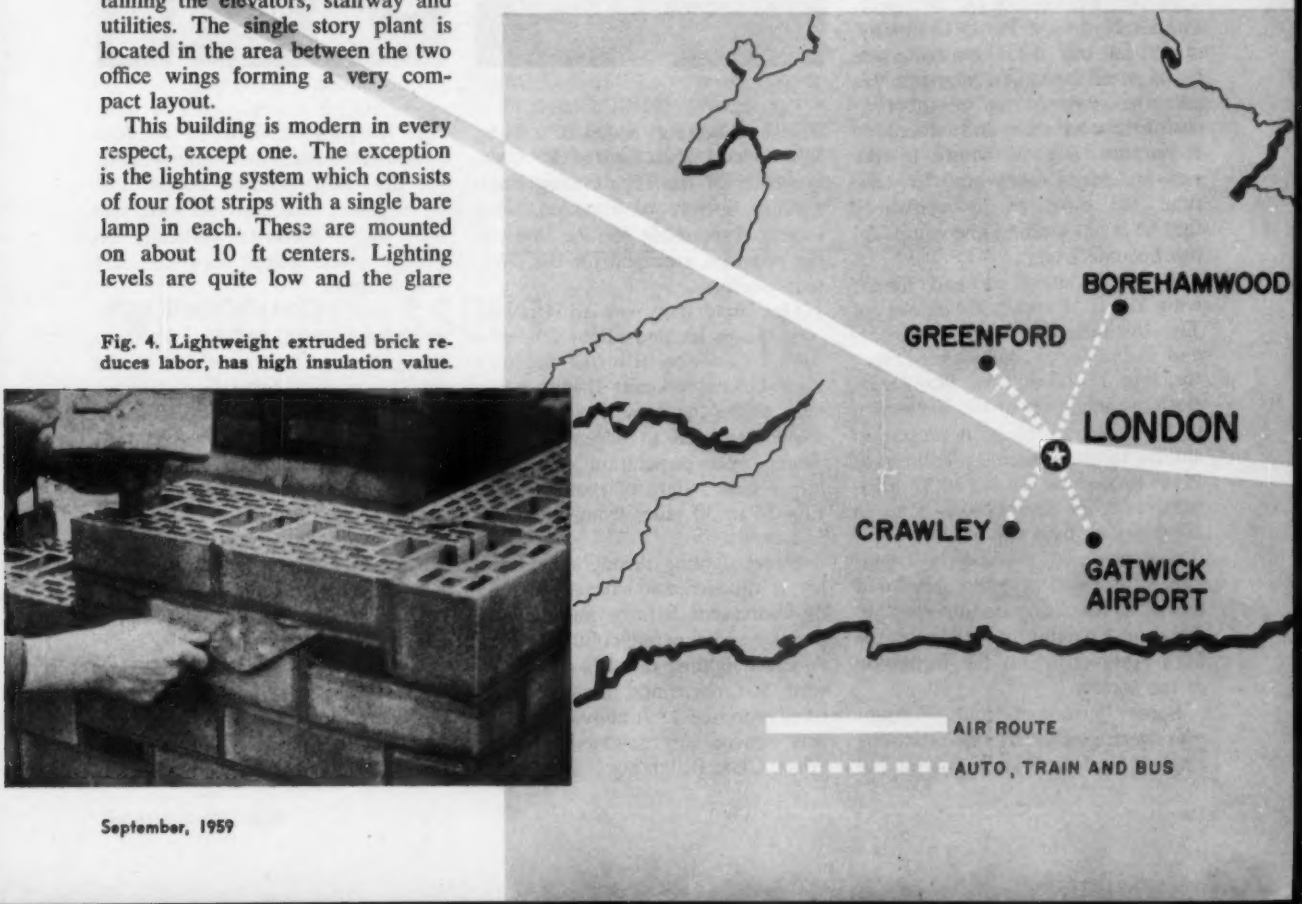
On plan, the bricks, Fig. 4, measure 8-5/8 in. by 8-5/6 in. and have large holes in the middle which serve two purposes. They enable the brick to be picked up easily with a central grip of standard brick width, and they assure the division of the mortar joint into two strips.

A 9 in. wall of the new bricks, Fig. 4, is equivalent to an 11 in. cavity wall and placing one new brick is equivalent to placing two standard bricks and wall ties. The weight of the bricks has been kept within limits that are convenient for handling with one hand.

Late in the afternoon we returned to London to visit the Grosvenor Road pumping station of the London Hydraulic Power Company. This is a rather unusual company as its only product is pressurized river water.

For 80 years, this company has

Fig. 4. Lightweight extruded brick reduces labor, has high insulation value.



LONDON AREA

continuously supplied high pressure hydraulic power from street mains in London. This power is available night and day all the year around at a guaranteed minimum pressure of 700 psi.

Customers use hydraulic power to operate elevators, presses and balers, cranes, pumps, intensifiers and for fire protection. Originally, the main pumps were driven by triple expansion vertical steam engines. These have been modernized, Fig. 5, by coupling 270 hp, 3300 volt motors to the crankshaft through triple reduction gearing.

The company has four pumping stations located around the London area. Three of these draw their water from the Thames River while the fourth draws its water from the Regent Canal. All suspended solids are removed by filtration before the water is pressurized and delivered to the mains.

Hydraulic mains extend for over 180 miles and meters located at the customers premises record the usage and form the basis for billing. After the high pressure water is used it is exhausted through the conventional sewerage system.

A. R. Leakey, Sales Manager, London Hydraulic Power Company, makes full use of his unusual name to improve customer relations. He tells the story of the complaining customer who calls and invariably is put into a good humor by the answer, "Mr. Leakey here." By the time the customer is convinced that he is not kidding, the complaint has become trivial.

In the evening we had dinner with R. F. Farmer, Secretary of The Institution of Plant Engineers and Colin Troup, Managing Director, John D. Troup Ltd., Publishers. Both are members of the Institution of Plant Engineers, an organization similar to the American Institute of Plant Engineers. Of the 4000 members, 500 are members-at-large in countries all over the world.

The next day marked the beginning of a 3 day program sponsored by the Illuminating Engineering Society of England to celebrate the 50th Anniversary of the formation of the society.

Some 75 visitors from 20 countries were greeted by our charming English hostess Joan Wood at the British Lighting Council offices. Miss Wood and George F. Cole, Secretary of the Illuminating Engineering Society of England, were largely responsible for the interesting program arranged for the overseas visitors.

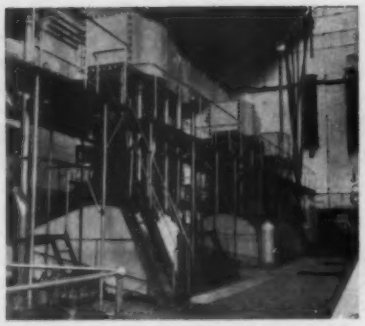


Fig. 5. Old steam driven hydraulic pumps were converted to electric drive.

Fig. 6. Author inspects model showing how airport will look when completed.

Fig. 7. London's newest building, Thorn House, rests on spread footings.

Fig. 8. Office lighting system uses two lamp fixtures, generate around 40 ft-c.

Our first trip was to Crawley New Town located about 29 miles south of London. It is one of fifteen New Towns in Great Britain being built under the New Towns Act of 1946. Intended to decentralize industry and population from the larger cities, eight of them lie in a ring 25 to 30 miles from the center of London.

Street lighting throughout Crawley is modern and consists mainly of fluorescent fixtures mounted on pre-stressed concrete columns. Class A street lighting consists of two 80 watt, 5 ft, horizontal fluorescent fixtures mounted 25 ft above the roadway spaced approximately 120 ft apart. Class B lighting is similar except it uses two 40 watt, two foot lamps. Principal road intersections use 250 watt mercury lamps. The town center uses four 80 watt, five foot lamps mounted vertically on post tops and spaced approximately 100 ft apart.

A new 132,000/11,000 v transformer station takes electricity from the grid line. It is then distributed underground to substations located throughout the area. At the substations the electricity is reduced to 240 v and fed by underground cable to the consumers. These low voltage underground cables contain five wires, consisting of three phase wires, a neutral and a wire for street lighting. The street lights are controlled by pre-set time switches located in the substations.

Our next stop was an inspection tour of Gatwick Airport billed as the first airport in the world to combine air, main line railroad, and road transport facilities in one unit.

Fig. 9. Art Barr, left, from Cleveland gets construction details from architect.

Located 25 miles south of London on the borders of Surrey and Sussex, the airport terminal has an adjacent railroad station with frequent train service direct to London.

Construction work at the airport is about 90 per cent complete based on my comparison of the airport with the scale model of the completed project, Fig. 6. Lighting is quite modern and very pleasant. It is interesting to note that maintenance was considered right from the start as a built-in catwalk above the false ceiling in the main concourse provides ready access to lighting fixtures in this area. Lateral louvers used in these fixtures consist of slats of wire glass.

One of the high points of our visit to England was dinner at the Houses of Parliament on Friday evening, June 12. This was arranged by Charles Royle, M. P., and was preceded by a tour through the House of Commons and House of Lords. Our group was most fortunate in having Mr. Royle as our guide; he supplied many interesting stories about English history as we walked through the Houses of Parliament.

To round out our program, our last field trip before leaving London was to be the inspection of a modern office building called Thorn House. The headquarters of Thorn Electrical Industries Ltd., this building represents the most advanced British thinking on office block design.

The general arrangement is a 180 ft high tower block, Fig. 7, approximately 125 ft by 50 ft in plan, with the principal axis running east and west and a low level showroom approximately 175 ft by 23 ft running north and south. The tower block is 14 stories high and except for a glass enclosed entrance foyer, is open for the first two stories.

This building is claimed to be the first really high building in London. Most buildings are only 10 stories high due to the difficulty of providing suitable foundations on the 300 ft of clay underlying the London area. Thorn House rests on spread footings that permit this unusual height.

Office areas, Fig. 8, are illuminated to about 40 ft-c using fixtures with plastic shielding containing two eight foot lamps rated at 125 watts and 7500 lumens per lamp. The basement of the tower block is taken up by service areas, such as the boiler room, air conditioning equipment and a garage.

Andrew Renton, Partner, Basil Spence and Partners, architects for Thorn House, acted as our guide and is shown in Fig. 9 pointing out some of the construction details to Art Barr, General Electric Co., Cleveland.

Lighting in the garage is from an experimental high frequency system using a three phase 400 cycle, 240 volt generator. Fixtures operating on this system have a single four foot, 40 watt tube and a one foot by four foot plastic enclosure.

The stairwell in the south west corner of the tower block has an unusual lighting system. This stairway, running the whole 180 ft height of the building has a well a little over four feet square.

At the top of the stairwell, mounted to the ceiling and central to the stairwell is a 42 in. diameter parabolic mirror having a 3000 watt, 110 volt filament lamp at its focal point. The closely controlled beam of light projected down the stairwell is interrupted at every floor landing by a disc of diffusing material.

Each disc has a circular hole cut in the center allowing some light to pass through unimpeded; the size of the hole and thus the amount of light intercepted and diffused by the discs is arranged in relation to the distance of the disc away from the mirror. On the twelfth floor the hole is quite large and at ground level quite small.

ON TO BRUSSELS

The XIV session of the International Commission on Illumination began in Brussels on Monday, June 15. More than 500 delegates from 24 countries, including 52 delegates from the U. S. A. attended the session.

Head of the American delegation was H. Herbert Magdsick, Illuminating Engineer from Cleveland, Fig. 10. There was only one other editor from a technical trade publication at the conference, Ruby Redford, Editor, *Illuminating Engineering*, Fig. 11.

During the first week of the ses-

sion, parallel meetings were held at which 16 Committees of Experts, who work continuously in the field of activity assigned to them, reported on the progress and status of their work. Thirteen Secretariat Committees also reported on the advances which have been realized in their fields during the past four years.

Three of the reports of Committees of Experts were prepared and presented by U. S. Chairmen. These were in the fields of Colorimetry by D. B. Judd, Physicist, National Bureau of Standards; Causes of Discomfort in Lighting, by Sylvester K. Guth, Manager, Radiant Energy Effects Laboratory, Lamp Division, General Electric Company, Nela Park, Cleveland; and Airborne Lighting by T. M. Edwards of the Grimes Manufacturing Company, Urbana, Ohio.

During the last two days of the session, 23 papers were presented, three of them by U. S. delegates. These were "A General Method of Specifying the Quantity of Interior Illumination From Performance Criteria" by Dr. H. R. Blackwell, Ohio State University; "The Effect of Specular Reflection on Visibility" by Professor D. M. Finch, University of Calfornia, and "An Analogue Computor for the Predetermination of Luminance Patterns" by P. F. O'Brien, Department of Engineering, University of California.

Summarizing some of the technical reports of interest to the plant engineer we find that in the field of industrial lighting there is a tendency noted in the use of light sources with higher wattages and increasing popularity of mercury and reflector lamps. Luminaires giving some indirect light are being more widely used around the world and the shielding of light sources is recommended in many countries. Plastic materials and light alloys are finding increased favor for the construction of lighting fixtures and reflectors of anodized or vaporized aluminum are popular.

In the section dealing with office lighting, developments can be noticed both in the quantity and in the quality of the lighting where more attention is given to the prevention of direct and reflected glare. This is the case with regard to artificial as well as daylighting. The appropriate distribution and control of both of them has given rise to many investigations. In the use of artificial light sources the continuous spread of the use of fluorescent lamps is noticeable.

A subject of great interest is the session dealing with Agreeable Luminous Environment. The problems facing this committee are not purely physical and ordinary scientific methods of investigation are inapplicable. All elements of the visual field must be studied and these studies must result in the establishment of certain brightness ratios, the preparation of a color atlas directly useful to designers of lighting systems and the drafting of recommendations for lighting conditions. These recommendations must have general validity.

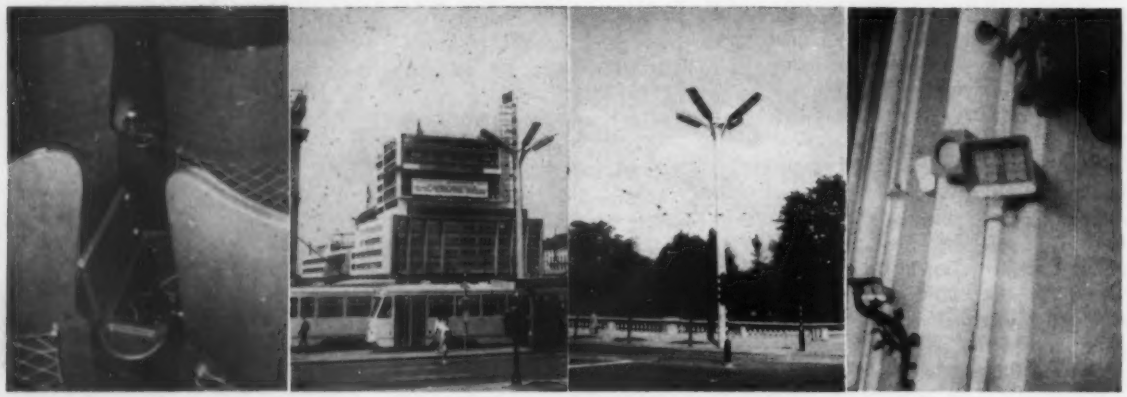
As a preliminary to experimental work to be carried out in model rooms, it is necessary to prepare a detailed analysis of existing installations which are considered to exemplify good practice. Information regarding colors used in interiors in all countries as well as the behavior of colors under different kinds of light must also be investigated.

Every session of the conference

Fig. 10. H. Herbert Magdsick, head of the United States National Committee.

Fig. 11. Ruby Redford, Editor, Illuminating Engineering, at conference.

Fig. 12. Equipment at each seat connects to translators. Fig. 13. New 28 story office building under construction in Brussels. Fig. 14. Modern fluorescent street lighting is widely used. Fig. 15. Gas-fired infrared heaters used in old cathedral.



was simultaneously translated into the three official languages, English, French and German. Each seat was equipped with a transfer switch to select one of three languages and a small ear speaker for listening to the translation, Fig. 12. It is quite an experience to hear a discussion in French, questions in English and answers in German.

There is a great deal of new construction going on in Brussels. Figure 13 is a view of le Centre International Rogier which will be 28 stories high when completed.

On Sunday, June 21, the delegates went on a trip to the Belgian coast with visits to Ostende, Wenduine, BlankenBerge, Zeebruge and Knokke, with lunch in the latter city. Then inland for an expertly conducted tour of Bruges and winding up the day with a Breughelion supper and dance at Wieze.

The conference closed on Wednesday, June 24 with a meeting that summarized progress and recommendations, election of new officers and selection of Vienna as the site of the 1963 meeting.

AND TO PARIS

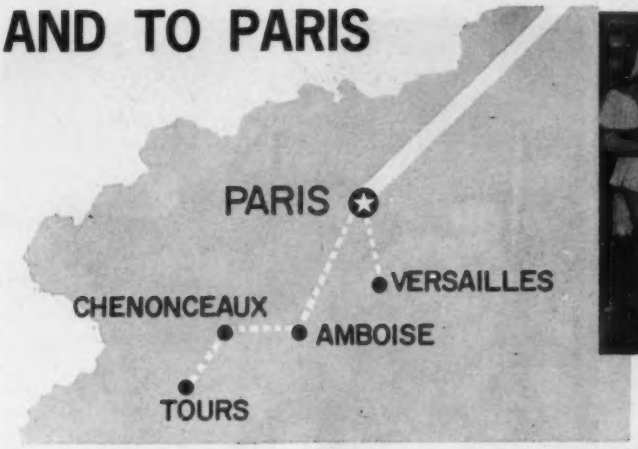


Fig. 16. Modern control panel used to produce "Son et Lumiere" spectacles.

Twelve people in the American delegation were scheduled to continue on to Paris where the French delegates had made arrangements to see several versions of "Son et Lumiere". This is a form of entertainment, held in the evening, that uses light, sound and color to tell the history of a famous chateau.

To gain a better understanding of how the various lighting effects are created, we were invited to inspect the equipment installed in the showrooms of the Clemancon Company. This company furnished the lighting control equipment used in the "Son et Lumiere" at Versailles.

Here in a room crammed with spotlights, projectors, autotransformers, electronic equipment and control panels, Georges Leblanc, Chief of Lighting Service, demonstrated various effects on a small stage at one end of the room. Many different colors were produced by moving a single knob on a small control box. With this system, colors can shift slowly with varying degrees of intensity and produces beautiful effects.

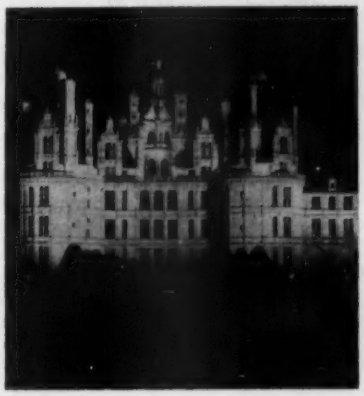
One of the most spectacular effects was the illusion of a full rolling sea such as you might find in the middle of the Pacific Ocean. As this effect is created by projection through a transparency and controlled to reproduce the actual wave motion, the results were quite realistic. I could almost smell and feel the salt spray.

All of the explanations were made in French and translated into English by Mr. Leblanc's secretary, Miss Tourne. Many of the discussions on how the equipment operates delved into electronics and photoelectric control and this charming Frenchwoman took them right in stride. Miss Tourne also accompanied us as a technical interpreter on a three day tour which included attendance at Son et Lumiere shows at Versailles, Chenonceaux and Amboise.

The most impressive of these was the show at Versailles which has a connected load of 1300 kva of lighting. Primary distribution is 15 kv to 400 kva of transformers. Distribution to the circuits in the gardens is at 230 v operating on a relay control system due to the great distances from the central control panel, Fig. 18. **End**

Fig. 17. Miss Tourne of Clemancon Co., technical interpreter during tour.

Fig. 18. Typical of "Son et Lumiere" spectacles is the chateau at Chambord.



CHECK THAT FUEL OIL!

Varying Characteristics Change Boiler Performance

By GREGORY GOULD, President, Fuel Engineering Company, New York City

IT IS SURPRISING to find how often boiler plants are operated on the assumption that oil is consistently uniform in characteristics. To the contrary, there are six variable characteristics which affect boiler plant performance and these are, therefore, a factor in costs and operating efficiency. Without an analysis of the characteristics of the fuel input, evaluation of steam plant performance is subject to corresponding uncertainties and undesirable quality variations go undetected.

Engineers and others who are content to accept the commercial specifications for fuel oil without taking into account individual variations are handicapping themselves in the performance of their duties. The six most important characteristics which can be determined by laboratory analysis are: 1. API gravity (specific gravity). 2. Btu per lb (per gallon). 3. Viscosity. 4. Sulfur. 5. Flashpoint. 6. Water and sediment.

API gravity as an index of heating value of fuel oil may frequently lead to misinterpretation of boiler performance. A statistical analysis of determinations on No. 6 grade oil made in our laboratory indicates that in 33 cases out of a 100 the actual Btu of an oil will deviate from an average for a given API figure by more than 800 Btu per gallon. This is equivalent to a variation in price of about $0.20 per barrel in one area. Thus, a hydrometer test will not give completely accurate information.

The efficiency of the boiler cannot be accurately determined without knowing the heating value per unit fired—heat per pound or per gallon. The amount of air required is also directly related to heating value. If air is supplied in proportion to heating value, it is possible to secure high combustion efficiency with maximum percentage of CO_2.

Fig. 1. Heating value of fuel oils with same specific gravity indexes can be different.

Viscosity characteristics of fuel oil are related to the temperature needed to provide good atomization. Further than this, satisfactory pump performance places limitations on maximum viscosity. The application of heat beyond that which is actually required is wasteful and adds needlessly to operating expense. On the other hand, failure to apply sufficient heat imposes extra pumping expense, will reduce combustion efficiency, create smoke and generally add to total operating expense. Only by accurate control of preheat can optimum conditions be maintained.

The National Survey of Burner Fuel Oils conducted in 1956 by the U. S. Bureau of Mines showed variations in viscosity expressed in Saybolt Seconds Furol at 122 F from a low of 28.2 to a high of 310 in oil samples obtained in eastern United States.

It has been a recent trend in fuel oil purchasing to place an upper limit on the percentage of sulfur. Municipal air pollution ordinances have recently been revised with the sulfur limit set a 1 per cent. Thus it becomes important to know the percentage of sulfur in fuel oil being received particularly where such limits are in force.

The corrosive effect of the combustion products of sulfur on boiler metal is pretty well established. Generally, the higher the sulfur content of a given oil, the greater is the rate of corrosive damage possible.

Experimental tests indicate that corrosion is least at maximum CO_2. On the other hand, as surface temperatures of metal approach acid dewpoint temperatures, rates of corrosion increase rapidly and some adjustment to keep flue gas temperatures up even at some sacrifice in efficiency may be justified under such conditions.

Difficulties with sulfur occur with the highest incidence where sulfur contents consistently exceed 3 per cent. The survey of burner fuel oils referred to earlier, discloses No. 6 grade fuel oils' sulfur variations from less than 1 to almost 4 per cent. Generally oils guaranteed to contain less than 1 per cent sulfur will command premium prices.

Flash Point

Flash point is significant from a viewpoint of safety as well as being an indicator of contamination. In heavy fuel oils normal flash points do not generally have too much safety significance. However, minimum flash points are generally regulated by municipal, state or federal laws and these do not always agree with the National Bureau of Standards commercial stipulations.

Low flash points may indicate contamination with a more volatile petroleum product which in addition to safety hazards can cause unstable flames or even vapor lock. Generally flash points of No. 6 grade oil do not fall much below a minimum of 170 F.

Water and Bottom Sediment

The presence of water and bottom sediment in oil tends to cause fouling of strainers and difficulties with burner mechanisms which may be manifested by the accumulation of unburned carbon in the burner, unstable flames, and sparky fires. As a result a serious loss of efficiency can take place. Sediment may accumulate in storage tanks and on strainers and burner parts obstructing the free flow of oil to the burner. The frequency with which strainers and nozzles must be cleaned is directly related to the amount of bottom sediment present.

Water is the basic cause of corrosion in the oil storage and handling system. Large amounts of water will cause flame instability. Generally, total water and sediment below 1 per cent will not upset operations. The national survey of burner oils disclosed a range from a trace to a high of 1.5 per cent. Our laboratory occasionally sees water and sediment much higher than this.

Sampling Fuel Oil

While the value of fuel oil can be judged by the characteristics of a sample as determined by laboratory analysis, the sample must be representative or a wrong evaluation will be made. This seems obvious but is all too often overlooked. Even in such seemingly small matters as choice of a sample container care must be exercised. The container must be clean and dry and be made of a material that will not react with the oil. If in doubt, the best choice is a glass jar.

Taking a truly representative sample tends to be over-simplified and "grab" samples are often taken rather casually from points of greatest convenience.

From a standpoint of sampling boiler fuel, one usually wishes either to obtain a sample representative of the average quality actually burned in order to determine plant performance, or to obtain a sample representative of average quality being delivered.

Wherever possible, a "continuous sample" is most desirable. These can be obtained by inserting two or three one-quarter inch pipe nipples of varying length into a vertical run of pipe, each fitted with a stopcock arranged to discharge into a common container. These stopcocks are then adjusted to give a desired quantity of gross sample for the quantity being sampled. This is often set at 1/10th of 1 per cent of a lot or shipment if the sample does not exceed 40 gallons total. Lesser proportions often prove satisfactory. This gross sample must be thoroughly mixed before a laboratory portion is poured off.

Another method for accumulating a gross sample that is particularly useful for use in determining plant performance is to take increments from the drain line at the strainer. When each increment is taken, be it at each watch, or each day, or the like, the drain iine should be thoroughly blown down first. This step disposes of accumulations of water and sediment that would contaminate the sample. The increments are then accumulated in a closed container until the end of the sampling period. The gross sample is then warmed to about 100 F, tumbled for a period of 5 to 10 min and a laboratory portion of about 1 qt poured.

Dipper and "thief" samples are also used as increments of gross samples as well as to spot check individual deliveries. A thief is messy and not too easy to use. Dipper samples, which can only be taken from free-flowing streams, have the handicap that such a stream is seldom available in heavy fuel oil handling systems. **End**

Fig. 2. Checking viscosity, one property to be considered when handling fuel oil.

Photo: Albert Kahn Associated Architects and Engineers

Fig. 1. Main aisle placed along outside wall to expedite traffic to shipping department at Chrysler plant, Detroit.

Fig. 2. Employees' elevated walkway that serves to remove foot traffic from truck aisles at General Motors' plant.

Photo: Albert Kahn Associated Architects and Engineers

LAYING OUT STORAGE SPACE OR AISLES?

Here's How To Avoid Trouble-Making Errors

By A. T. GAUDREAU, Consultant, Gaud-Reau Associates, Weston, Conn.

Layout and Integration of Material Flows in Plants—The flow of material through a plant or warehouse is mainly governed by the layout of traffic aisles, crane runways, and conveyors at various levels from floor to ceiling. The placement of these traffic lanes is, in turn, dictated by the allocation of floor areas to the various machine groups, processing departments, storerooms, and storage blocks. First and finishing operations are usually located to begin or end on an aisleway. In other words, aisles are planned before machines are located thereby providing direct movement of parts without congestion.

In assigning locations to manufacturing departments, it is well to integrate the flow of materials on paper between these departments before the layout plans are completed. A convenient way of doing this is to arrange the department areas around on a rough layout plan until the most economical flow of material between departments has been determined. The next step would be to select the most suitable and economical type of handling system to carry the material from one department or area to another. And the final stage of flow planning would be the establishment of direct traffic routes between these allocated areas.

Manufacturing departments can then be broken down into work areas within each department. In laying out aisles to integrate the flow of material in and out of the several work areas, the problem would normally be approached in the following sequence:

a. Determine the approximate number of square feet of floor space required for each of the work areas, and cut out a square template for each area. The ultimate shape of each template can only be decided upon later.

b. Determine the most frequent and direct sequence of movement from each work area to whatever other area or areas the material will flow. From this traffic study, select the sequence of work areas which will incur the shortest routes of flow.

c. On a floor outline of the entire plant, place the work-area templates in positions which will approximate the ideal arrangement developed in step b, having due regard for headroom limitations, structural obstacles such as columns, and floor-load restrictions wherever they exist.

d. Position the machine templates within each work-area tem-

plate, and determine the most suitable type of material handling device to service each work area internally and at the same time integrate the plantwide flow for all work areas.

Each machine template in turn becomes a self-contained work station to be serviced by the plantwide flow of materials. The proper positioning of each machine template within each work-area template has a direct influence on the ultimate efficiency of handling materials to and from the machine.

In thus planning the main flows of material in and out of work areas in a plant, the floor traffic factors which assist in formulating an integrated plantwide flow usually include the following:

1. Size of each work area.
2. Traffic between all work areas.
3. Sequence of work areas.
4. Shape of each work area to form composite blocks of areas enclosed by aisles.
5. Structural limitations in headroom, floor-load capacity, and building obstacles.
6. Most suitable material handling system within each work area.
7. Most suitable coordinated plantwide flow to service all work areas as an entity.

Fig. 3. Main traffic aisle linking 20-in. drop in floor level at general merchandise warehouse of Morris Paper Co.

Table I. Space layout factors to be considered in storage and aisle planning.

a. Building Characteristics	b. Material Characteristics
Floor-load capacity	Package type (cartons, drums, rolls, flat stock, etc.)
Column locations	Stockability (weak cartons, long pieces, explosives, etc.)
Platform locations	Temperature requirements (furnaces, ovens, refrigerators, etc.)
Ramp locations	Humidity limitations (dryness, as for chocolate, etc.)
Door locations	Bulkiness and weight (large items stored on floor)
Elevator locations	Outdoor properties for suitability to yard storage
Floor dimensions	**d. Material-handling Facilities**
Cross-aisle intersections	Storage rack locations for pallet loads
Fire-aisle locations	Storage bin arrangement for loose stock
Ceiling height	Pallet design (two-way or four-way)
Sprinkler-system layout	Industrial trucks (width, height and weight including load)
Lighting facilities	Order-assembly area, size and location
c. Stock Requirements	Receiving area, size and location
Turnover (fast-moving items)	Shipping area, size and location
Rotation (first-in, first out, etc.)	
Grouping (integration of lines)	
Peak inventory of each item	
Lot sizes received	
Lot sizes shipped	
Order-filling procedure	
Cubic space utilization	

Table II. Standard aisle widths that give economical space usage with utility.

Fire walkway (if required) between stored goods and any wall	**2 ft - 0 in.**
Fire-access aisle for wheeled hose-reels and wall mounted hose	**3 ft - 0 in.**
Bin aisle between rows of permanently-mounted bins	**3 ft - 0 in.**
Cross-aisle for manually-propelled floor trucks	**4 ft - 0 in.**
Aisle space for single-run conveyor not over 18 in. wide	**4 ft - 0 in.**
Traffic aisle for industrial trucks between bin sections	**5 ft - 0 in.**
Service aisle between rows of stock: for manual storage	**6 ft - 0 in.**
Storage aisle for right-angle stacking of 48-in. pallet loads:	
Using 2000-lb rider-type outrigger stacker	6 ft - 0 in.
Using 2000-lb high-stacking straddle walkie	6 ft - 0 in.
Using 3000-lb rider-type outrigger stacker	7 ft - 0 in.
Using 2000-lb rider-type counter-balanced fork truck	8 ft - 0 in.
Using 4000-lb walkie-type counter-balanced fork truck	10 ft - 0 in.
Using 3000-lb rider-type counter-balanced fork truck	12 ft - 0 in.
Service aisle between rows of stock: for mechanical storage	**10 ft - 0 in.**
Main transportation aisle permitting two fork trucks to pass	**12 ft - 0 in.**
Receiving or shipping aisle, including room for one row of pallets	**16 ft - 0 in.**
Highway truck aisle for side unloading and loading	**20 ft - 0 in.**
Car-track aisle for side loading and unloading:	
On narrow-gage tracks	30 ft - 0 in.
On standard-gage tracks	34 ft - 0 in.

Physical Characteristics Determining the Layout of Space—Aside from the foregoing traffic factors, however, a number of underlying physical characteristics must first be recognized and duly provided for in the detail layout plans. The study of these factors should precede the actual setting up of work areas, storage spaces, and traffic arteries for warehouses as well as for plants.

Characteristics in question center mainly on the requirements and limitations imposed by the building design, properties of the materials handled, stock selectivity and activity, and types of material-handling facilities to be used. These space layout factors may vary considerably from one work or storage area to another on the same floor

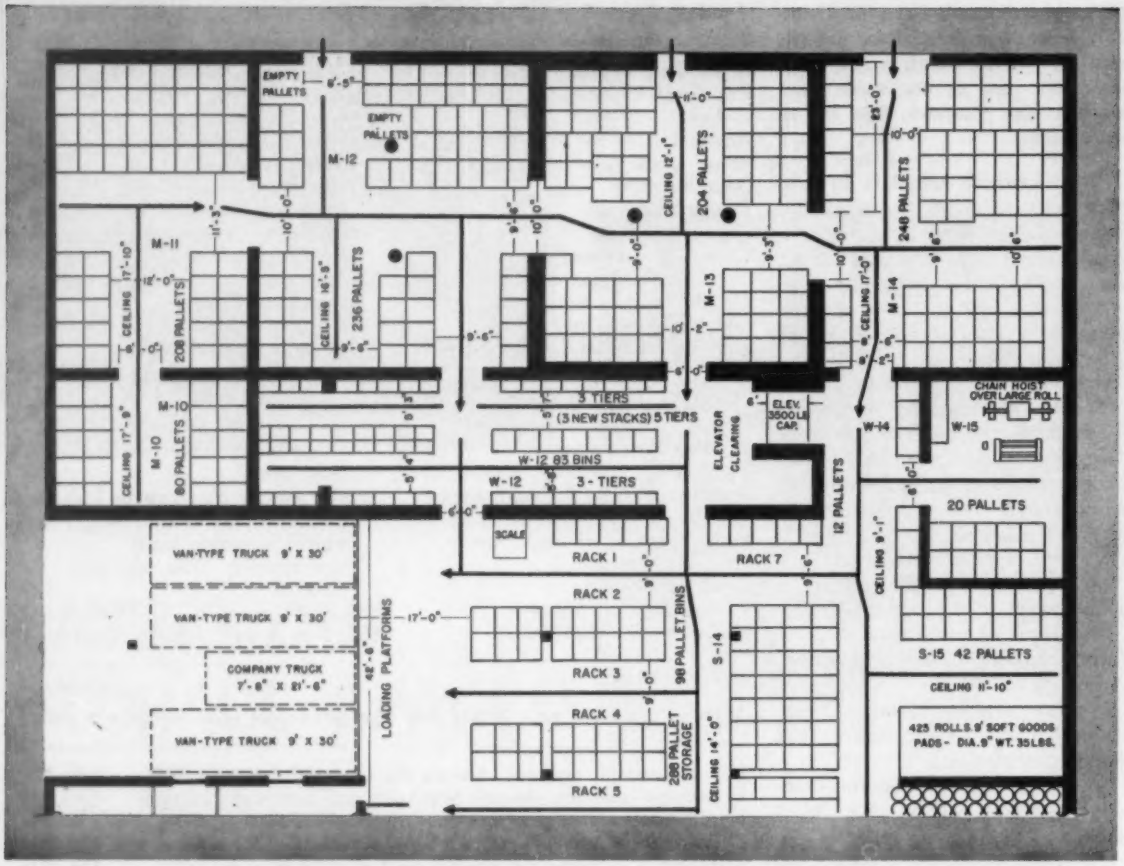


Fig. 4. Aisle layout for a plan integrating twelve buildings into a warehouse formed around a solid U-shaped pattern enclosing area used for truck loading.

Table III. Calculation of cubic storage capacity in integrated building above.

FLOOR STORAGE AREA				CUBIC STORAGE CAPACITY			
	Room Dimensions						
Room Number	Length in Ft	Width in Ft	Sq Ft per Room	Ceiling Height	Tiers per Stack	Number of Stacks	No. of Pallet Loads
First Floor							
M-11	28.1	44.7	1,256	17' - 10"	4	52	208
M-12	39.1	44.7	1,748	16' - 5"	4	59	236
M-13	38.2	44.7	1,708	12' - 1"	3	68	204
M-14	34.8	44.7	1,556	17' - 0"	4	62	248
W-11	28.1	18.6	523	17' - 9"	4	20	80
W-12	70.1	18.6	1,304	14' - 0"	Storage bins only		
W-14	13.8	18.6	257	9' - 1"	2	6	12
W-15	19.5	29.0	566	8' - 7"	2	10	20
S-14	59.5	81.5	4,849	14' - 2"	4	91	288[1]
S-15	19.5	27.8	542	11' - 10"	3	14	42
S-16	19.5	20.0	390	12' - 1"	Rolls standing on end		
G-15	45.5	27.7	1,260	12' - 11"	3	42	126
G-13	54.4	27.7	1,507	20' - 6"	Vertical stalls only		
Total first floor			17,466	Total first floor		424	1,464[1]

[1]Exclusive of the 98 pallet bins reserved for assembling outgoing shipments by highway trucks. Rack numbers 1 through 7 contain 49 stands of 2 bins each, or 98 bins in total.

as may be observed from the classification subdivided into four categories in Table I.

Space layout and aisle arrangement are more easily planned for buildings not yet constructed than for existing structures. Furthermore, large-sized buildings usually offer greater latitude in planning space layouts than is possible to attain in the smaller types of plants and warehouses. A combination of small-sized rooms in an existing small-sized building thus intensifies the problem of planning a space layout which will be the setting up of an integrated plantwide flow of material.

Selection of Yard Widths for Both Plants and Warehouses—Depending upon its intended purpose, an aisle in a plant or warehouse may range in width from 2 ft for fire walkways up to 34 ft for receiving and shipping aisles. In plant yards where sideloaders are used, traffic aisles may extend to 35 ft or more in width.

The purposes served by these

aisles are primarily to provide adequate clearance for passing vehicles, and for permitting certain of these vehicles to make right-angle turns inside the aisle lines in order to reach into adjacent floor-storage areas. Aisle widths commonly accepted as standard for plant and warehouse are listed in Table II.

Aisles and doors are inherently inseparable since they furnish ready access to one another. Because the location of doors is usually of a permanent nature, aisles are often laid out with reference to doors. **Main aisles** are the arterial highways of the plant or warehouse, and must therefore extend through the entire length of the building. **Cross aisles,** on the other hand, run at right angles to the main aisles and therefore in line with the short sides of a rectangular structure.

Main aisles are not necessarily located in the interior portion of a floor area with cross-aisle offshoots extending to right and left. A main trucking aisle, for example, may be placed along an outside wall as illustrated in Fig. 1. The flow of material is toward that wall, and finished products can be moved quickly and efficiently to shipping. The aisle was made 2 ft wider than the two widest loads moving in it. All truck traffic to and from shipping pass in the aisle. The side doors are used only in emergency loading. Good lighting of aisles, as shown here, is an important factor in productiveness and in freedom from accidents.

Pedestrian Aisles

Foot traffic on this aisle is held at a minimum. In the larger and newer plants, it is not unusual to provide employees' walkways entirely separated from truck traffic aisles. These pedestrian aisles are sometimes placed at an elevated level as illustrated in Fig 2.

Much emphasis has been placed since World War II on the occasional advantages of one-story buildings over multi-story structures. Comparatively little attention has been given to the fact that the very unilevel travel the one-story building offers as a material-handling advantage to a manufacturing plant usually becomes a crippling disadvantage in a warehouse. The principal cause of this adverse effect is the difference in the direction of flow of material in a plant as against that in a warehouse.

In a plant the material normally flows progressively in a one-way direction, from receiving to shipping, with little or no back-tracking. A one-story building in this case eliminates all vertical transportation between floors, and permits the river of material to move relentlessly through process without turning back at any stage in the flow.

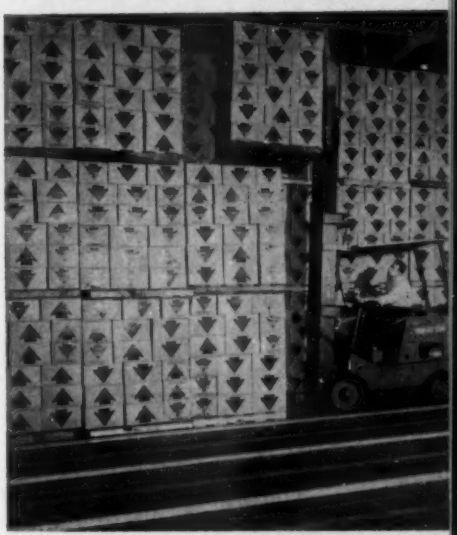
Flow of material through a warehouse, on the other hand, is neither continuous nor one-way. On the contrary, it is both intermittent and reciprocative in nature. The merchandise enters a warehouse in large quantities at infrequent intervals, and leaves the warehouse in smaller lots at frequent but irregular intervals thus causing a distinctly intermittent flow. Furthermore, the material moves forward from receiving into storage, and backward out of storage on its way to shipping, thus resulting in a reciprocative movement of material.

Multi-Story Story

Forward and backward movements of materials carried on at irregular intervals inevitably give rise to an incessant amount of horizontal backtracking which cannot conceivably be eliminated by the use of a one-story building. In fact the travel distance of these backtracking movements is usually lengthened in a one-story building. This is occasioned by the necessity of traversing the entire acreage of floor space in the process of moving merchandise from storage to shipping, such as from acre number 7 to acre number 1 in a seven-acre floor area.

In a multi-story building consisting of, say, seven superimposed acres of floor space, each floor occupying one acre, the movement of merchandise is in terms of feet rather than in that of acres. The movement from acre number 7 to acre number 1 in this case consists of lowering the merchandise a mere distance of 78 ft (13 ft by 6 floors) instead of moving it horizontally across seven acres, or 300,000 sq ft of ground space.

Main traffic aisles in some buildings may have to connect floors of different levels by means of ramps forming an intrinsic part of the aisle



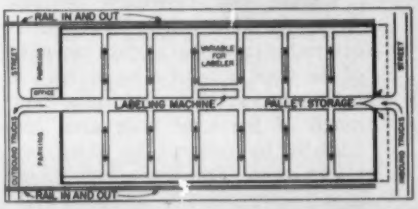


Fig. 5. Top, right: Pallet lanes marked off by floor lines. Each set of lines encompasses carload of canned goods.

Fig. 6. Center, right: Twenty-foot highway truck aisle through canned goods warehouse of Stokely-Van Camp.

Fig. 7. Bottom, right: Oblique stacking of pallet loads of bulk canned goods to height of 17 ft 6 in. in fruit cannery.

itself. Such an aisle linking a 20-in. drop in floor level in a warehouse is illustrated in Fig. 3. The view is taken from a spot looking along the aisle towards a raised shipping platform at far end in upper left corner of photograph. Note shipping door location, clearly recognizable at this point. The floor truck seen in the left background is rolling down the low-pitch ramp which connects the 20-in.-high floor level in the foreground with the groundlevel elevation in the background, both levels being a part of the same floor.

High-piling which is made possible by palletized loads handled by fork trucks is clearly evident to the right of the aisle shown here. As will be noted, pallet loads may be piled five or six tiers high, two tons at a time instead of one roll or one package at a time. Furthermore, one or two such high stacks can be moved out and re-piled elsewhere in a matter of a few minutes thus permitting the constant retention of all stocks of a given item in one lot, and the removal of that consolidated lot from storage spot to storage spot as expediency demands in avoiding honeycombing in storage space utilization.

Laying out Palletized Storage Areas in Connected Rooms—To determine the cubic storage capacity of the floor area of a warehouse, it is first necessary to determine how much of the total floor area can actually be covered by stocks of merchandise. This is generally designated as floor-space utilization. Allowance must be made for traffic aisles, structural columns, elevator shafts, stair wells, receiving and shipping docks, storage bins and racks, garage space, and office areas. The proper arrangement of these service areas calls for a studied layout plan such as the one shown on Fig. 4.

In this diagram, it will be noted that the 12 adjacent buildings (of which 9 are shown) integrated into this warehouse are enclosed by masonry walls ranging in thickness from 1 to 2 ft. The thirteen rooms constituting the first floor are interconnected by doorways which, for the most part, are not in direct alignment with each other due to the presence of structural columns at varying locations in the different rooms.

This irregularity in the arrangement of these columns (such as in rooms M-12 and M-13) introduces continual obstacles in the laying out of straight connecting aisles (identified by arrowheads) for the transportation of merchandise from the railroad siding on the left to the shipping platform in the lower center of the diagram. Because of the multiplicity of masonry walls separating the solid cluster of thirteen rooms of the first floor in this particular illustration, a study of the storage capacity of the entire floor necessitates a separate study of each room.

Floor area within each room is shown in Table III. The total floor area for all the thirteen rooms on the first floor amounts to 17,466 sq ft. For the purpose of making due allowance for aisles and columns in each room, however, reference is made to the drawing in Fig. 4 where each pallet stack is indicated by a small rectangular area.

Based on the selection of a standard pallet measuring 40 in. by 48 in. for this layout, with fork entry on the 40-in. sides of the pallet, and allowing a 2-in. leeway around the four sides of each pallet stack for better truck maneuverability, a 42 in. by 50 in. rectangular space is blocked off on the drawing for each palletized stack of merchandise which can be stored conveniently in each room.

Thus, in room M-11 in the upper left-hand corner of the drawing, 52 such stack spaces can be accommodated after making due allowance for truck aisles. The outlet direction of these truck aisles is indicated by arrowheads.

The number of stacks which may be accommodated in the floor area of each room has already been determined on the floor plan, and is listed on Table III. In room M-11, it will be recalled, 52 stacks can be stored. By multiplying "Tiers per Stack" by "Number of Stacks," the "Number of Pallet Loads" which may be stored in each room is determined directly as shown in the last column of Table III. The 17,466 sq ft of area usable for storage purposes on the first floor can thus provide cubic storage capacity for 1464 palletized loads of merchandise.

Stacks of pallets are started at the wall and the rows continued toward the aisle. In large storage areas located between aisles, the rows of pallet stacks are usually started at an imaginary lateral line paralleling the aisle lines and located about half-way between them. This arrangement makes it possible to store different stock items back to back.

Storage of Large Lots

Large lots of a given item of merchandise may be stacked in long solid rows containing enough stacks to fill a carload as illustrated in Figure 5. Only pallet loads of the same commodity, packaged in the same size containers, containing equal quantities of stock, and similarly palletized should be stored in the same row. To facilitate the alignment of stacks in these deep rows, each row is usually bounded by two parallel floor lines such as used in designating traffic aisles. These row lines are clearly recognizable in the photo.

Photo: Towmotor Corporation

Fig. 8. Side-unloading a truck in 20-ft center aisle with doors at both ends of aisle to permit straight-through travel.

When pallets are stacked at right angles to the aisle lines, as already illustrated in Figs. 4 and 5, a fork truck has to make a full 90-deg right-angle turn into the storage area in order to pick up a pallet load.

So, by slanting the stacks a few inches per foot with relation to the aisle line, a fork truck can pick up a load with only one-half a right-angle turn.

Oblique stacks of this type are illustrated in Fig. 7. The aisle for half turns can consequently be made from 18 to 24 in. narrower than for full 90-deg turns. This apparent saving in floor space is partially lost, however, by the saw-tooth arrangement of the stacks at the two ends of each row. Furthermore, the expected faster selection of stock from this arrangement has not always materialized in practice. As a consequence, oblique stacking has not enjoyed wide acceptance.

Indoor Aisleways for Highway Trucks and Railroad Cars—In some mass-quantity storage and shipping operations there are carloads and shiploads of products of closely identical commodities and packages which readily lend themselves to side-unloading highway trucks and railroad cars for shipping by rail or water. Such products include canned goods, packaged beer, bagged and baled goods, newsprint rolls, and scores of similar merchandise shipped in massive and recurrent lots.

To unload these carriers and place their cargo in storage to await shipment, traffic aisles of sufficient width are usually necessary in straight runs through the entire length of the storage buildings. This technique has long been used in lumber sheds, pipe shops, steel mills, and other indoor areas where long-shaped products are handled.

Straight-Through Aisle

Layout of a canned goods warehouse containing a 20-ft highway truck aisle is shown in Fig. 6. The aisle is 500 ft long and runs through the center of the building parallel to the long sides. It has a door at each end to permit highway trucks to enter, stop at the correct bay for unloading or loading, and continue through the building without having to turn around. The cross aisles are 12 ft wide, and the rail docks flanking the building are each 14 ft wide.

Since the highway trucks cannot turn around in their aisle, their unloading and loading operations have to be planned progressively if the trucks have to stop at more than one spot along the aisle. The need for this load planning may be observed in Fig. 8 showing a flat-bed road truck being unloaded from one side at an empty bay.

As the truck progresses along the aisle, unloading operations may be carried on in other bays located in the direction of the truck travel. It will be noted also that in order to unload the far side of the road truck in the picture, the truck itself would have to be spotted with its near side hugging the aisle line in the lower foreground.

A side-loading and unloading job can also be performed with flat cars inside a building as shown in Fig. 9. In this case a 30-ft wide traffic aisle bisecting a 469-ft long wharf shed is used for unloading palletized newsprint rolls from narrow-gage flat cars at a paper mill. The unloading of these cars is done by fork lift trucks operating from the side of the car. Unlike the case of unloading road trucks in the same manner, however, an unloading area or strip has to be provided for both sides of the carrier. This is because the car tracks are fixed, and the cars cannot be moved from one side of the aisle to the other as can be done with road trucks.

Conveyor Traffic Aisles and Utilization of Storage Space—Single runs of roller conveyors normally require an aisle strip on each side to permit the throw-off and throw-on activities of loading and discharging the conveyors. This is illustrated in Fig. 10. The example is a paint warehouse where the conveyors are used for moving cartons of paint. The aisle space thus required for conveyors of the simplest type consists of the width of the conveyor itself, say, 18 in., plus the width of a 15-in. working strip on each side, thus resulting in a 4-ft aisle for each floor-mounted conveyor run. **End**

Fig. 9. Thirty-foot car-track aisle bisecting paper mill wharf shed that houses newsprint rolls for shipment by water in Pacific Northwest. Building is flanked on sides by docks.

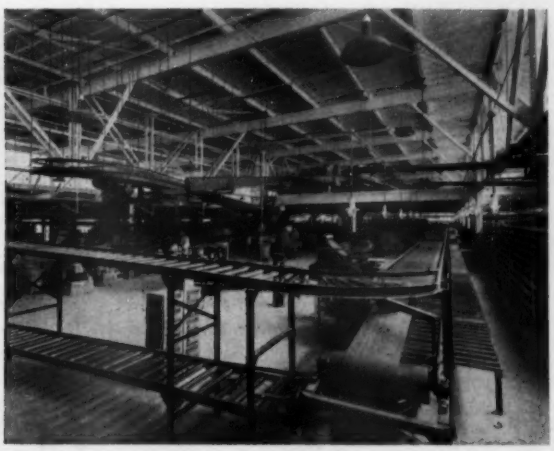


Fig. 10. Network of roller conveyors, with flanking side aisles, in the paint warehouse of Sherwin Williams Company. Conveyors are used to move cartons of paint.

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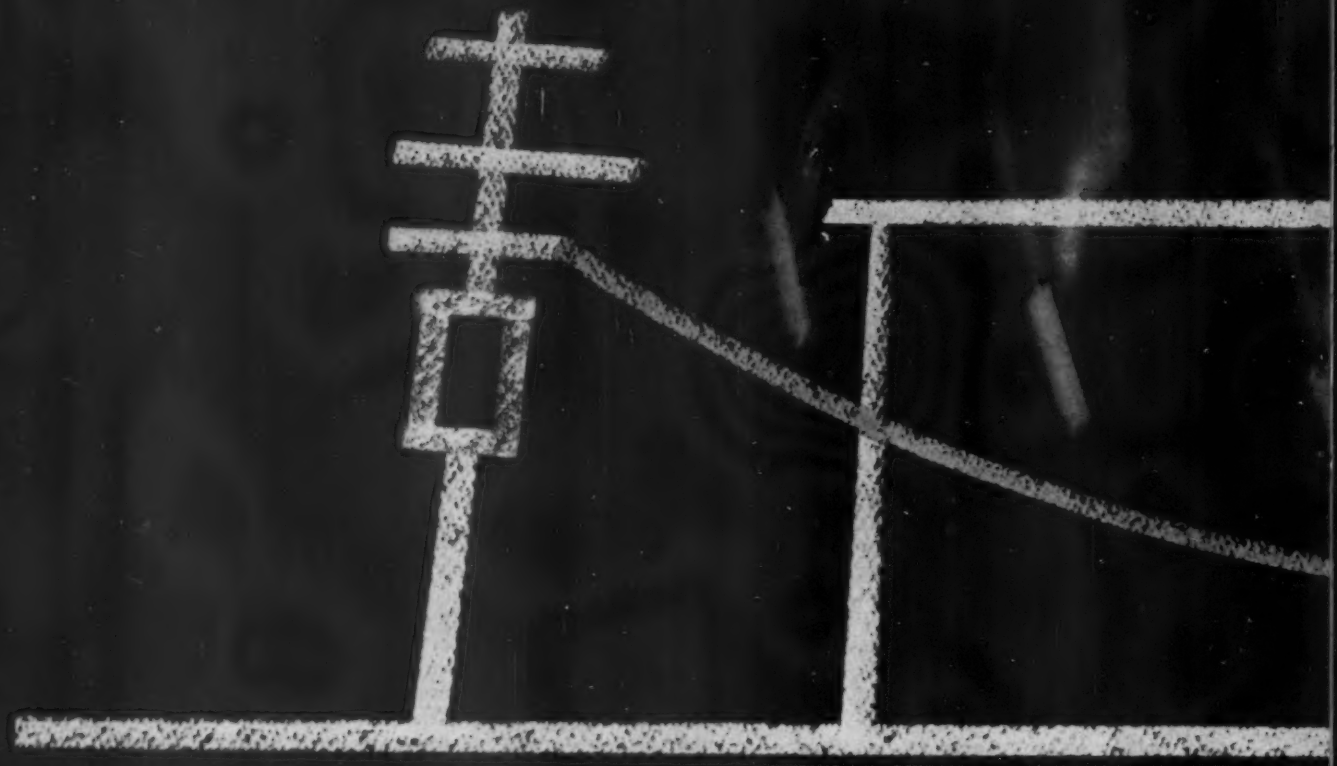

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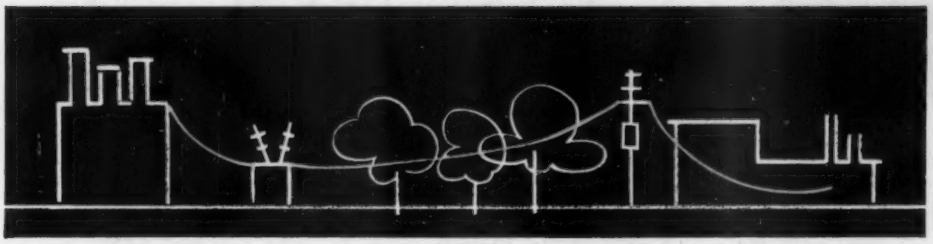

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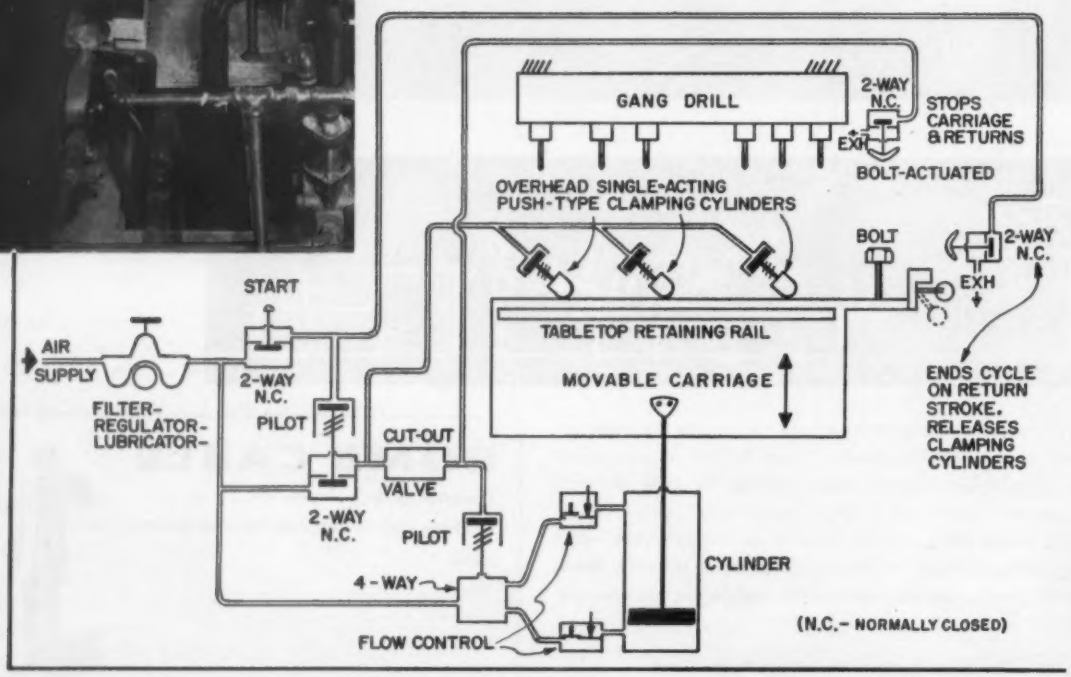
LOOK TO AIR

Air power gets versatility from "building blocks". Here are a few working possibilities

Fig. 1. Using three clamping cylinders mounted in a vertical position, an operator can drill six screw holes at a time in the edge of wood aprons. Schematic diagram shows the piping arrangement for such an operation.



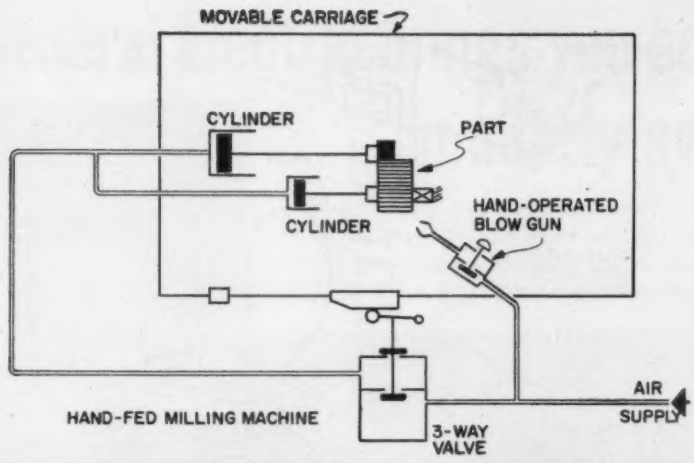
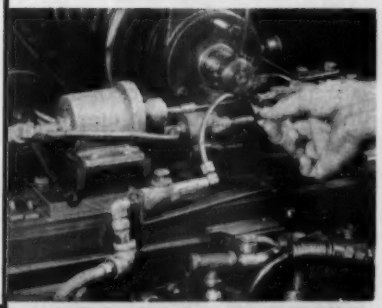
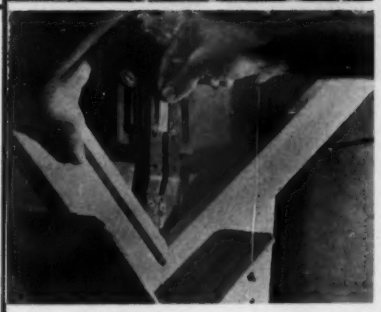


Fig. 2. A large and a small clamping cylinder hold workpiece in position while it is milled. Air valve at lower right corner is cam-operated.





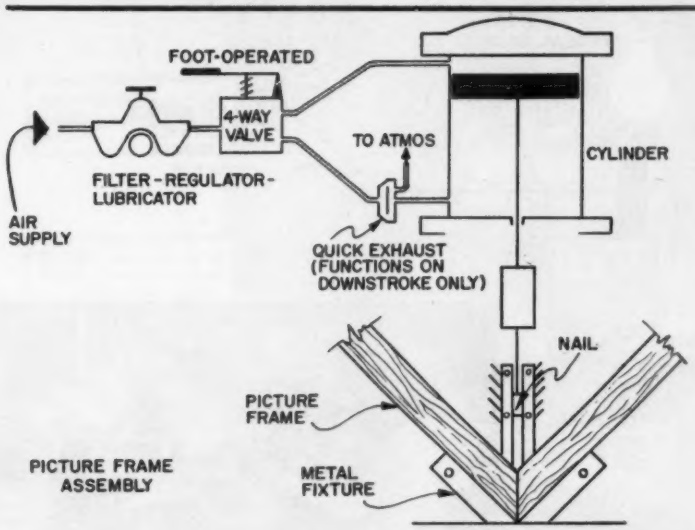


Fig. 3. Picture frame production went up over 300 per cent with air-operated nailer. Sketch at left shows hookup of the various components.

AS MECHANIZATION of manual operations and automation of production lines continue on the increase, more plants are going to basic air controls. The plant engineer is faced with a choice of air, hydraulics, electricity and electronics, or a combination of two or more as a solution in production engineering and conversion. A knowledge of the uses and advantages of air is a must before such an important choice can be made.

Air, as basic a vehicle for actuation as you can find, is sometimes taken for granted as offering limited application. This article demonstrates just how flexible and yet how simple and efficient air control can be, by pointing to specific installations now in operation and by describing uses and advantages of air systems.

Air controls' basic tool is the cylinder. Starting with a cylinder and a three-way control valve, a limitless variety of operating possibilities exist. For example, such equipment can be used to clamp two parts together, make a force fit, head rivets, apply a label, feed cutting tools, shear, blank or cut, trip a clutch or throw a switch, move a part in process, or shift a conveyor path.

Use of Air Nozzle

Even without a cylinder, a simple blast of air through a suitably directed nozzle can eject work from a die or jig, move parts into a chute, clear away chips or scrap, remove liquids, apply a spray and perform many other valuable production steps.

Following are just some of the many features of air control which help make air a desirable medium for economical power and a strong contender when choosing the most appropriate production aids.

Compressed air is usually available since most shops and plants already have air lines. Usually existing plant compressors are satisfactory power sources for operating additional air controls. Actual air pressure in plant air lines varies. Most air control devices such as valves, pistons, fittings, hose, blow guns, regulators, lubricators and so on are designed to work at a standard 100 psi pressure. Standardizing on a plant pressure in the 75 to 90 psi range permits many economies to be realized.

Use of air controls increases capabilities for standardization of tools, materials, and methods employed by maintenance staffs. As an example, air connections can be entirely stan-

LOOK TO AIR . . .

dardized due to highly interchangeable and standardized components. As one of the oldest manufacturers of air control equipment in the world, A. Schrader's Son, now a division of Scovill Mfg. Co., has long realized the advantages of easy interchangeability and standardization, and how directly these conveniences reflect on over-all maintenance and operating conditions.

Air controls are dependable. A minimum of machine refinement is required to automate an existing job, making use of the easy control of force and speed of air.

With air the mystery is taken out of maintenance because air system components are something that can be seen and touched, such as simple pipes, hose connections, valves and cylinders. Resistance to normal production hazards such as dust, corrosive atmosphere, splashing, paint spray and even submersion, is realized from hardy air control components. Because a compressed air tank is virtually a power reservoir, surges of power giving momentary high outputs of work can be delivered by air cylinders.

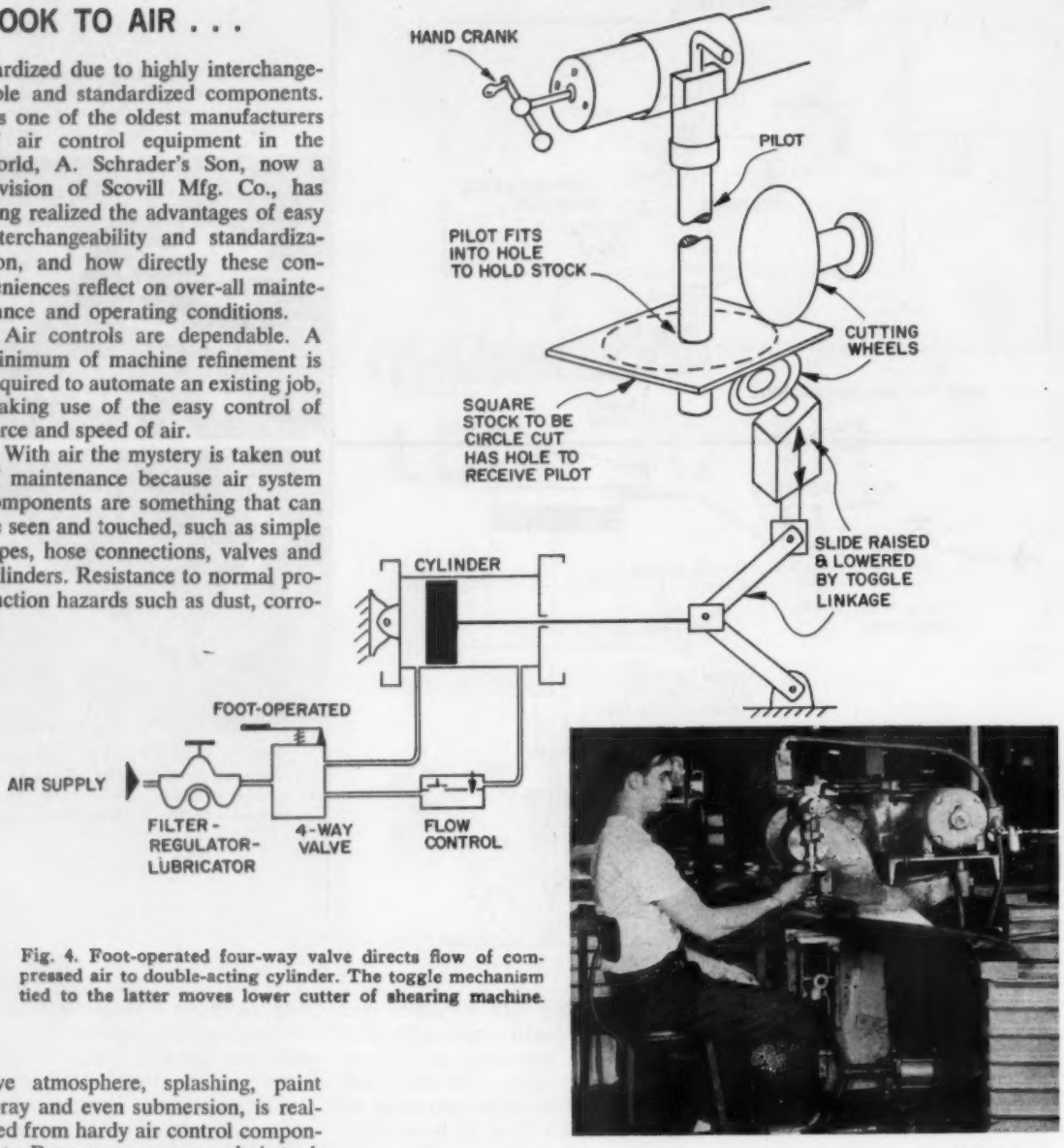


Fig. 4. Foot-operated four-way valve directs flow of compressed air to double-acting cylinder. The toggle mechanism tied to the latter moves lower cutter of shearing machine.

Furthermore, interchangeability and adaptability of air control components means that systems can be broken down and built up again in new combinations. This is particularly advantageous when there is retooling or a change in the production requirements.

Air may be used whenever there is a requirement for such actions as push or pull motions, repeating cyclic operations, motions synchronized with mechanical actions, clamping work in fixtures, reciprocating operations such as tripping and others.

Looking over the diagrams of several typical air control circuits and photographs of the actual installations during production shows that standard components are assembled into several basic operating groups. See Figs. 1 to 4. These groups are combined to build as simple or as complex an air control system as required.

Application of cylinder motion and air blast in the automation of production operations requires means of starting, stopping, timing, interlocking or setting up a sequence. Motions start at just the right instant, in the right order and often with controlled speed or force. The systems shown in the accompanying examples are made up of some basic "building blocks" of air control to accomplish tasks. Among the building blocks are single and double-acting cylinders, two, three, and four-way valves with or without timers or solenoids, cut-out valves, filters, and regulators. Air, a simple and economical source of power, has emerged as a sophisticated production tool. **End**

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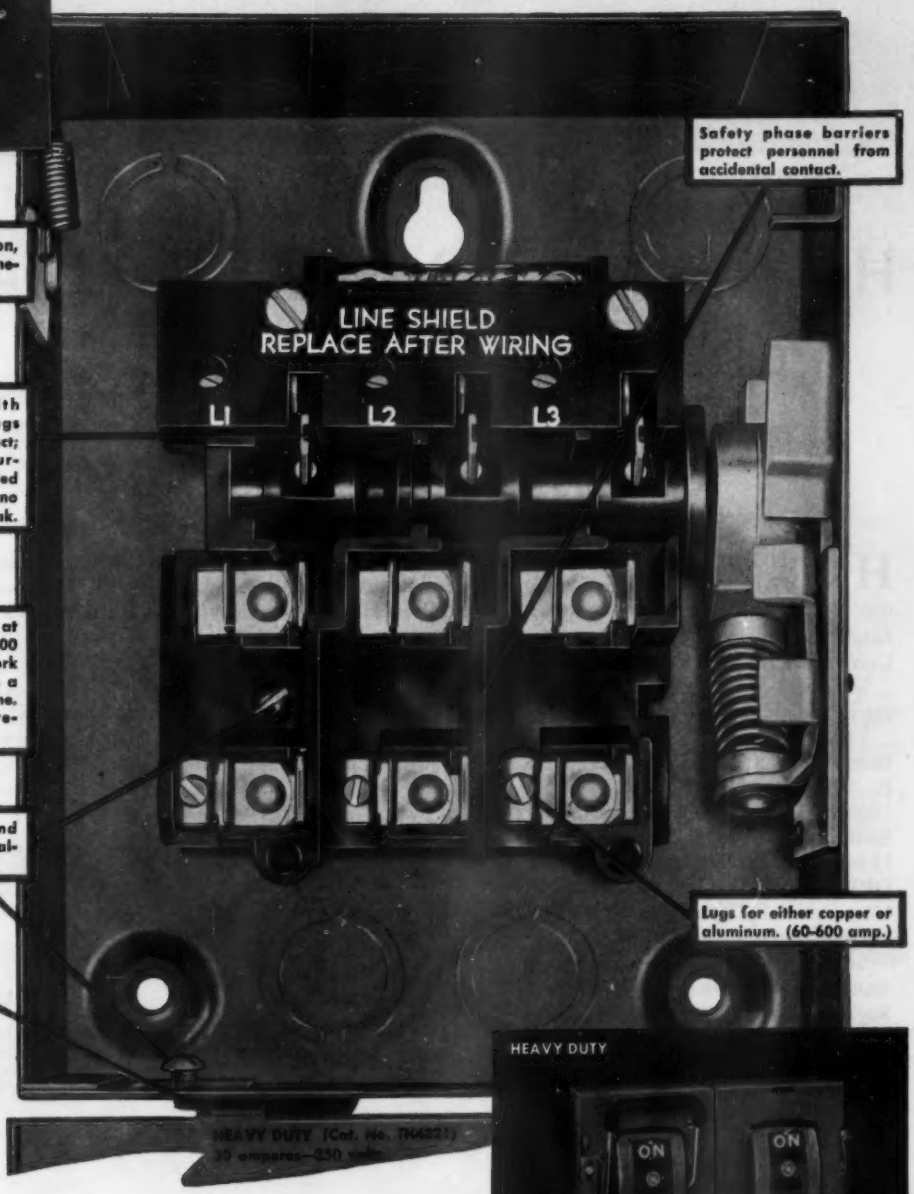

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Wire incoming lines at top or bottom. (100-600 amp.) Saves time, work and wire; lets you do a neater job in less time. ON-OFF indication remains unchanged.

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Bottom-hinged and front-operated for close ganging.

Safety phase barriers protect personnel from accidental contact.

Lugs for either copper or aluminum. (60-600 amp.)

GENERAL ELECTRIC

For more facts circle 568 on Reply Card

Photo of the Hawaiian Chapter taken at one of their recent meetings. They have been accepted as AIPE Chapter No. 47.

HAWAII—AIPE'S NEWEST CHAPTER

Other AIPE Activities:

Organizational meeting held in Monterrey, Mexico
Chapters elect officers for new term

HAWAII BECOMES Chapter No. 47 of the American Institute of Plant Engineers. They were officially accepted at the last Executive Committee Meeting of the AIPE.

Members of this chapter, appearing in the picture above, are:

Front row, left to right: R. Loo, Honolulu Gas Co.; C. Boerner, and E. Vourlas, both of U. S. Navy, District Public Works Offices; R. Smith, U. S. Army, Tripler Army Hospital; E. W. Beimes, U. S. Navy, DPW Offices; H. Graham, Shell Oil Co.; and W. Brown, U. S. Air Force, Headquarters, PACAF.

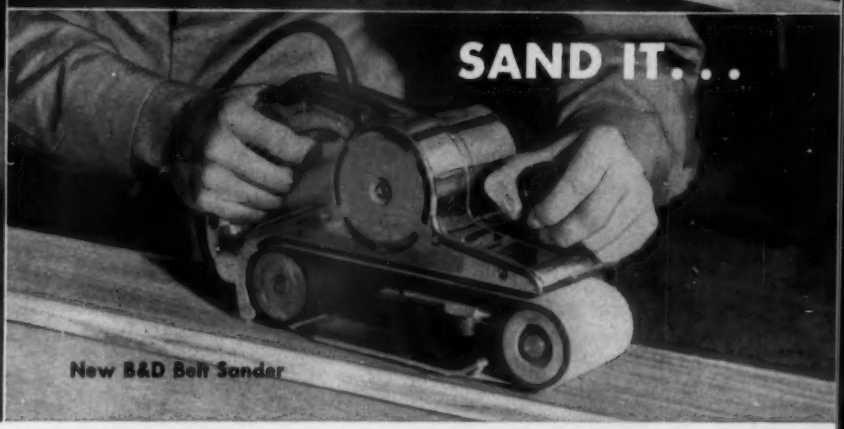
Second row, left to right: B. Kawauchi, California and Hawaiian Sugar Refining Corp.; A. Williamson, U. S. Navy, District Public Works Offices; R. Finn, U. S. Navy, Pearl Harbor Navy Shipyard; F. Stevens, Hawaiian Pineapple Co.; J. Shelton, U. S. Air Force, Pacific Air Forces; P. Hong, Hawaiian Electric Co.; W. Schirra, U. S. Air Force, Headquarters, PACAF.

Officers of this newest chapter are: E. W. Beimes, U. S. Navy, District Public Works Offices, Pearl Harbor, president; F. H. Stevens, Hawaiian Pineapple Company, vice president; M. Miller, Naval Supply Center, Pearl Harbor, secretary; and R. J. C. Loo, Honolulu Gas Company, treasurer.

Other members of this chapter are: J. Atherton, Hawaiian Electric Co.; J. Bowman, U. S. Navy, DPWO; R. Chamberlain, Kaiser Hospital; F. DeBoer, U. S. Navy, Public Works Center; W. Fielding, U. S. Air Force, Hqtrs, PACAF; W. Foster, Otis Elevator Co.; D. Grubb, Hawaiian Airlines, Ltd.; R. Mathews, Refrigeration Service & Supply; H. Muller, U. S. Navy, DPWO; M. Nahm, U. S. Navy, Pearl Harbor Naval Shipyard; L. Thompson, Haughton Elevator Co.

(Turn to page 156)

Men in attendance at the organizational meeting held in Monterrey, Mexico.



You get a faster job with these new Black & Decker woodworking tools!

FASTEST CUTTING Finishing Sander on the market; No. 88. H.D. Sander leaves no swirl marks—sand with, against, across the grain.

CUTS INTRICATE PATTERNS—Heavy-Duty Jig Saw combines a sabre saw, rip, cross-cut, coping, hand, hack and keyhole. 2″ capacity at 90°.

Where accuracy of cut, speed of work and powerful performance are a must—Black & Decker woodworking tools fill the bill.

ROUT IT . . . with the B&D 1 H.P. (Max.) Heavy-Duty Router . . . the lightest, most compact full-powered router on the market. PLANE IT . . . with the new B&D 1 H.P. (Max.) Power Plane . . . built and powered for continuous duty on the toughest jobs. SAND IT . . . with a B&D Belt Sander . . . the only truly *dustless* sander on the market.

Whatever your woodworking job—your B&D Distributor has the tool you need. Write today for full information.

YOU GET A Better Value FROM **Black & Decker®**

Quality Electric Tools

NO. 83 H. D. SAW cuts accurately, faster, yet runs cooler! This versatile, completely heavy-duty saw's perfect for all-around use.

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Company.....

Address.....

City.....Zone.....State.....

☐Drills

☐Vacuum Cleaners

☐Sander-Grinders

☐Bench Grinders

For more facts circle 735 on Reply Card

Monterrey Meeting

An organizational meeting was held in Monterrey, Mexico, in May to discuss the formation of a plant engineers' group among the industries in the Monterrey area.

Jim Weeks, of Proto Tool Company, and national vice president of the AIPE, and Dick Morris, Editorial Director of PLANT ENGINEERING, attended the meeting to assist the group in organizing and to inform them regarding the benefits of international affiliation.

The men who attended this meeting appear in the photograph, p. 154. Among them are: Carlos O. Griffith, Angel Gonzalez, J. Sergio Lozano Davila, Ricardo Cueva, Armando Gonzalez, Jose Perez Maldonado, Jose G. Rodriguez, R. Brown, R. Tutzi, A. Maurer, Amando de J. Garcia, and Rodolfo Perez Salcido.

Officers of the Northern Illinois Chapter, seated, 1 to r, are: R. J. Podboy, and P. Ellingson. Standing, 1 to r, are: R. Gordon, W. Hayden, and B. Hutchins.

Newly-Elected Officers

Several of the chapters recently elected new officers. Newly-elected officers of the Northern Illinois Chapter are: R. J. Podboy, American Steel & Wire Co., president; P. Ellingson, Johnson Motors, vice president; and W. Hayden, Abbott Laboratories, secretary-treasurer. Board members are: R. Gordon, Griess Pfleger Tanning Co., and C. Holmgren, Johns Manville Corp. The national delegate for the January convention will be B. Hutchins, U. S. Navy.

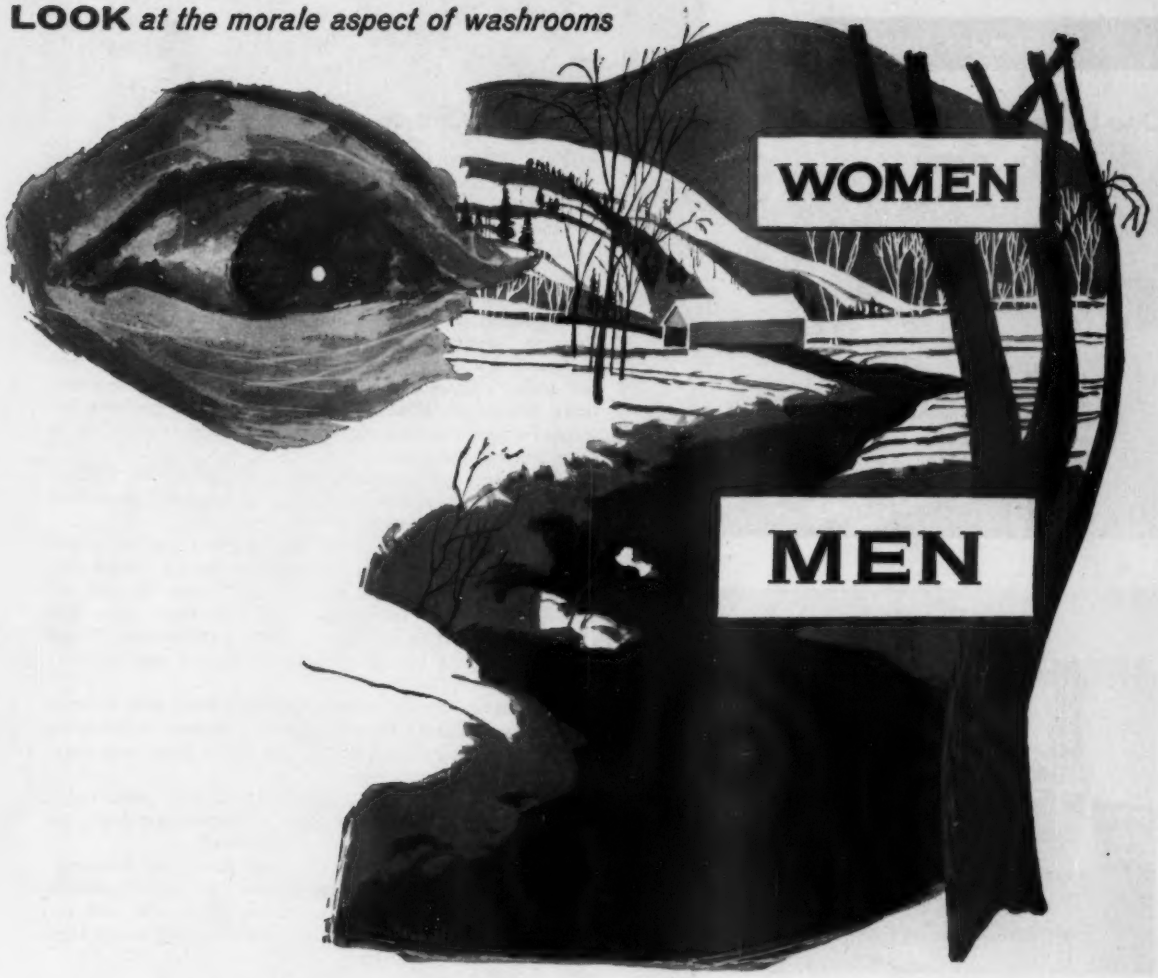
New officers of the Central Connecticut Chapter are: T. O. Elliott, State of Connecticut Southbury Training School, president; B. H. Sutphin, New Haven Copper Co., vice president; N. Timenes, Naugatuck Chemical Div., U. S. Rubber Co., secretary; and L. Vander Eyk, Bristol Co., treasurer.

AIPE National President W. C. Wallin, of Western Electric Co., Inc., Winston-Salem, N. C., is kept quite busy visiting the various chapters. He recently attended a meeting at the Kentuckiana Chapter to present lapel pins to their past presidents. Past presidents of this chapter are: C. C. Bassett, Belknap Hardware and Mfg. Co.; P. J. Sehlinger, Famco, Inc.; E. B. Worth, Philip Morris & Co., Inc., and C. R. Libby, W. E. Caldwell Co. **End**

Officers of the Central Connecticut Chapter are, 1 to r: L. Vander Eyk, treasurer; T. Elliott, president; B. Sutphin, vice president; and N. Timenes, sec'y.

W. C. Wallin, AIPE national president, presents lapel pins to past presidents of Kentuckiana Chapter, 1 to r, C. Bassett, P. Sehlinger, E. Worth, C. Libby.

LOOK *at the morale aspect of washrooms*



"HEALTHY" FRESHNESS

A clean, fresh atmosphere in washrooms pleases everyone. Makes washrooms "feel" clean. Reflects management concern for individual health and welfare.

This kind of freshness is easily maintained with modern automatic West deodorizers that contain a pleasantly perfumed aromatic fluid. These modern devices are neatly encased in white plastic. They are loaned, installed and maintained free of charge — as part of the WEST WASHROOM SANITATION PROGRAM.

The WEST WASHROOM SANITATION PROGRAM includes heavy-duty cleaners and disinfectants for facilities at regular intervals. Cleaners prevent drain clogging from salt buildup. Disinfectants kill micro-organisms that cause T.B., Polio, Typhoid, Influenza and other diseases.

Important too, the WEST PROGRAM gains the support of custodians so that they maintain high standards of sanitation.

The WEST WASHROOM SANITATION PROGRAM often saves enough to pay for itself. It includes an analysis of materials and methods that simplifies maintenance and leads to savings in towels, soap and other supplies. For full details, phone your nearby West office. Or mail the coupon to our Long Island City headquarters, Dept. 13.

☐ Send information on your WASHROOM PROGRAM.

☐ Have a Specialist phone for an appointment.

Name_____

Position_____

PROGRAMS AND SPECIALTIES
FOR PROTECTIVE SANITATION
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WEST CHEMICAL PRODUCTS INC.
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For more facts circle 569 on Reply Card

One Layer or Two—Manufacturers Give Users Their Choice

TWO STRADDLE CARRIERS, recently introduced, are specifically designed to handle cargo containers—moving them on or off rail cars or truck trailer bodies.

One, produced by the Hyster Co., was designed for a special job in Honolulu. Standing more than 20 ft high, over 12 ft wide and 24 ft long, the carrier transports detachable trailer containers which are eight feet wide, 8½ ft high and 24 ft long. The trailers were developed by Matson Navigation Co., for trans-Pacific shipment.

The truck is used to lift the aluminum boxes on and off trailer chassis and narrow-gage Hawaiian railway flatcars. Maximum lifting capacity is 20 tons, and the designed underclearance permits lifting the containers up to five feet off the ground.

This container operation allows cargo to be handled only twice—when it is loaded at the shipper's plant, and unloaded by the consignee.

The second carrier, Clark Equipment Company's Van Carrier, was designed for carrying and tiering freight containers. Within maximum capacity of 25 tons, the unit will handle containers measuring eight feet high, eight feet wide and 24 ft long. With slight modifications, it will carry containers four to nine feet high and eight to forty feet long.

The carrier can be driven straddle-fashion over a string of railroad flatcars to pick up and remove a container from a middle car; it will also pick up or place containers on flat-bed highway trucks.

Loads other than containers, such as steel plate, ingots and bales, can be stacked eight to twelve feet high, depending on the composition of the load.

The carrier has six wheels, four front and two rear. All are individually sprung on coil springs. Hydraulic, vacuum-powered brakes operate on all wheels, and six-wheel power steering is standard. Drive power comes from a six-cylinder gas engine.

Automatically-Controlled Process Removes Hydrogen from Steel—In the Ladle

A NEW METHOD of producing clean, tough steel for jobs such as die-blocks and forgings has been put into operation by A. Finkl & Sons Co., a Chicago producer of specialty steels.

The new process removes hydrogen gas, which causes microscopic cracks in steel, from the molten metal while in the ladle—on a regular production basis.

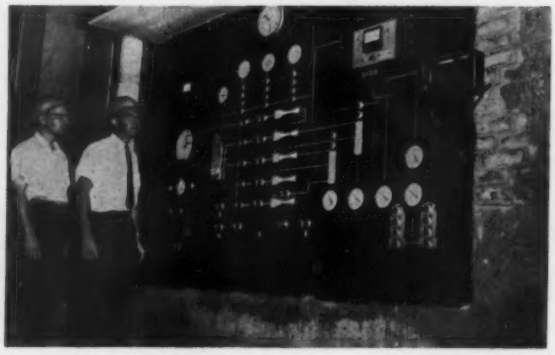
Former methods of removing hydrogen from steel included stream degassing, which is the vacuum degassing of steel as it flows from the ladle to the ingot mold. A limitation of this process is that the degassed steel can be poured into only one mold. With the Finkl process, the steel can be poured into several molds, since the ladle can be moved from one mold to another.

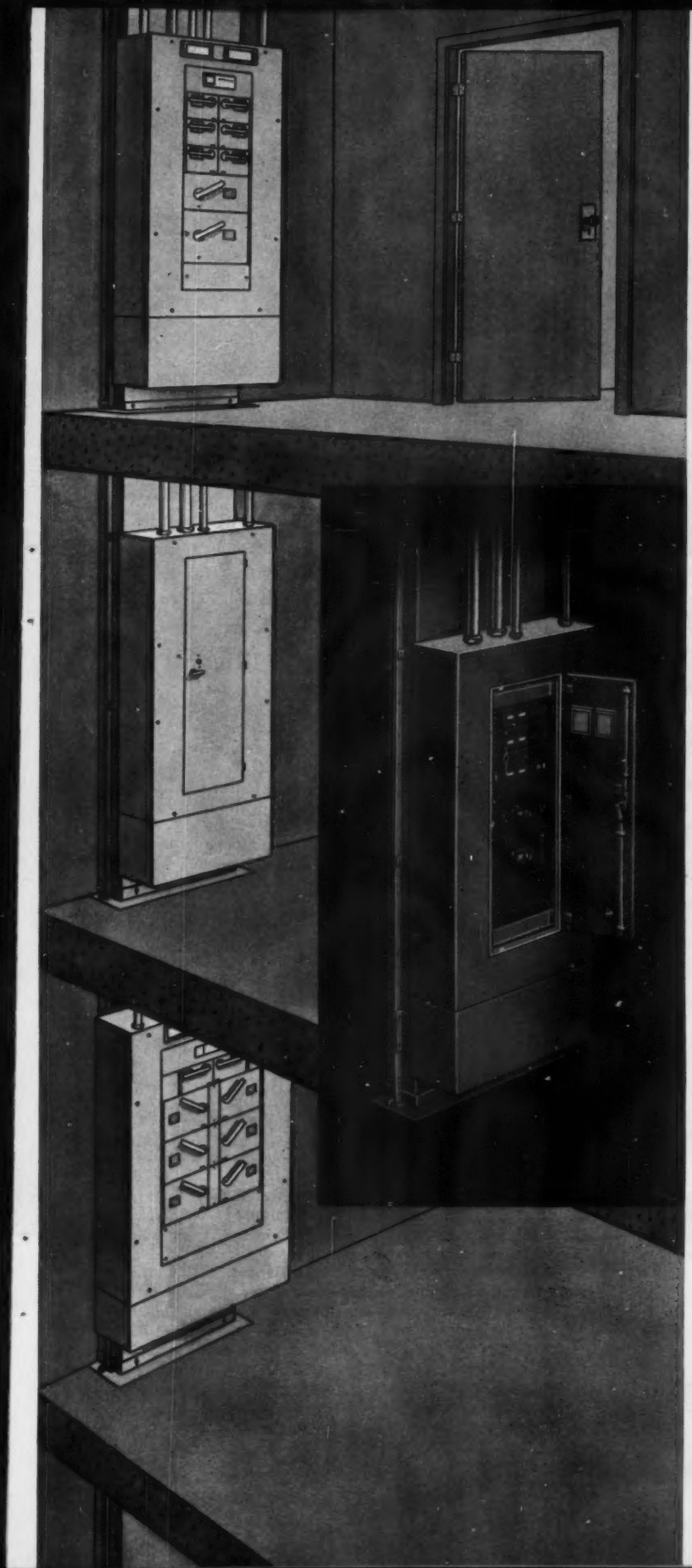
In a typical operation, a 75,000-lb batch of steel is poured from the electric furnace into a ladle. The ladle is then placed inside a large vacuum degassing chamber, where the degassing cycle is started. Four steam injector suction pumps are turned on in proper sequence by automatic controls. The control panel is one of the most important features of the system. Its automatic pressure switches and timers closely control the evacuation of the ladle, to remove the hydrogen.

The oxygen and nitrogen in the steel are also removed, although they are not so detrimental to the steel quality.

Bubbling of these gases out of the steel causes a turbulence; this is increased by the injection of helium gas into the molten metal. Helium serves as a scavenger to increase the rate of removal of the gases.

Tests show that up to 60 per cent of the hydrogen in the steel can be removed. The degassing cycle in the ladle takes about 12 minutes, during which time the steel loses very little of its temperature. This is an important consideration, even though the vacuum degassed steel can be poured at a temperature roughly 30 degrees lower than non-degassed steel.





Power to

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RISER DUCT BY BULLDOG

Now, there's a *sure* way to get ample power as many stories high as you like — BullDog's new combination of high-performance Lo-X® duct and integral-mounted power panels.

It's a system where a low, balanced voltage-drop can be predetermined . . . where power loss is minimized . . . and where each duct section has an extra reserved current capacity inherent in its construction.

Other advantages: Power may be tapped off through the compact panels at *any joint* on the duct. Panels bolt easily to the bus bars . . . are available with I-T-E Molded Case Circuit Breakers through 800 amperes or with BullDog's famous Vacu-Break® Switching Units through 600 amperes. Provisions for current-limiting Amp-traps* are optional to protect against dangerous high short circuit currents. And most panels have space for adding future circuits when the need arises.

Choose wisely, choose the finest. Choose Integral Panel—Lo-X Riser Duct by BullDog.

* Chase-Shawmut registered trademark

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I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 570 on Reply Card

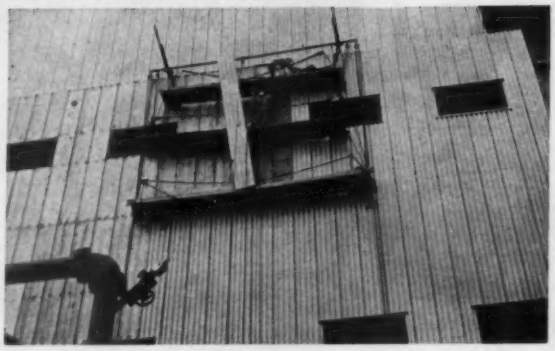
Enameled Aluminum Skin Beautifies, Protects New Generating Station

GRAY-GREEN VITREOUS ENAMELED aluminum—nearly four acres of it—covers the outside surfaces of the new Thomas H. Allen Electric Generating Station, at Memphis, Tenn.

Main building of the station, which is the largest steam power plant ever authorized at one time by any municipality, covers approximately 113,000 sq ft of ground. Towering 170 ft above grade level, the building houses the boilers, turbines and generators.

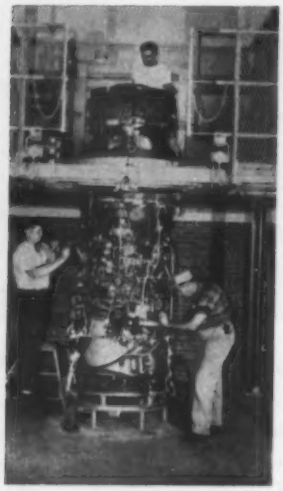
Side walls of the building were fabricated in layers and hung directly on the steel framework of the building. A sheet steel inner skin was welded directly to the girders, contributing to over-all rigidity. This sheet steel serves as the inside finish for most of the side walls. Channel spacers separate inner and outer layers, and the cavity between them is filled with fiber glass insulation.

The outer layer, of fluted 16-gage aluminum, was constructed by sliding grooved sections of the enameled metal together. Ends of the sections are interlocked in such a way that no fasteners appear on the building exterior.



The entire plant was designed by Burns and Roe, Inc.

Big Engine—Hole in the Platform



FIRST commercial airline installation of a vertical engine overhaul system is at the Jet Maintenance and Engineering Center, American Airlines, Tulsa, Okla.

Three stands, made by the Colson Corp., are used to break down and reassemble Pratt & Whitney jet engines brought to Tulsa for overhaul.

With the engine standing vertically in the center of the stand, the platform can be raised or lowered to give access to any part of the assembly, and to permit two crews to work simultaneously.

Big Unit—Hole in the Roof

MEASURING 30 ft in height and 15 ft in diameter at its thickest point, a crystallizer was recently installed in the Buffalo, N. Y. plant of Becco Chemical Div., Food Machinery & Chemical Corp.

The unit, manufactured by Struthers-Wells, Inc., was so large that the only way to get it into the building was to cut a hole in the roof.

Interesting note: the new unit replaces one that was limited to eight-months-a-year operation by the temperature of the cooling water supply from the Niagara River.

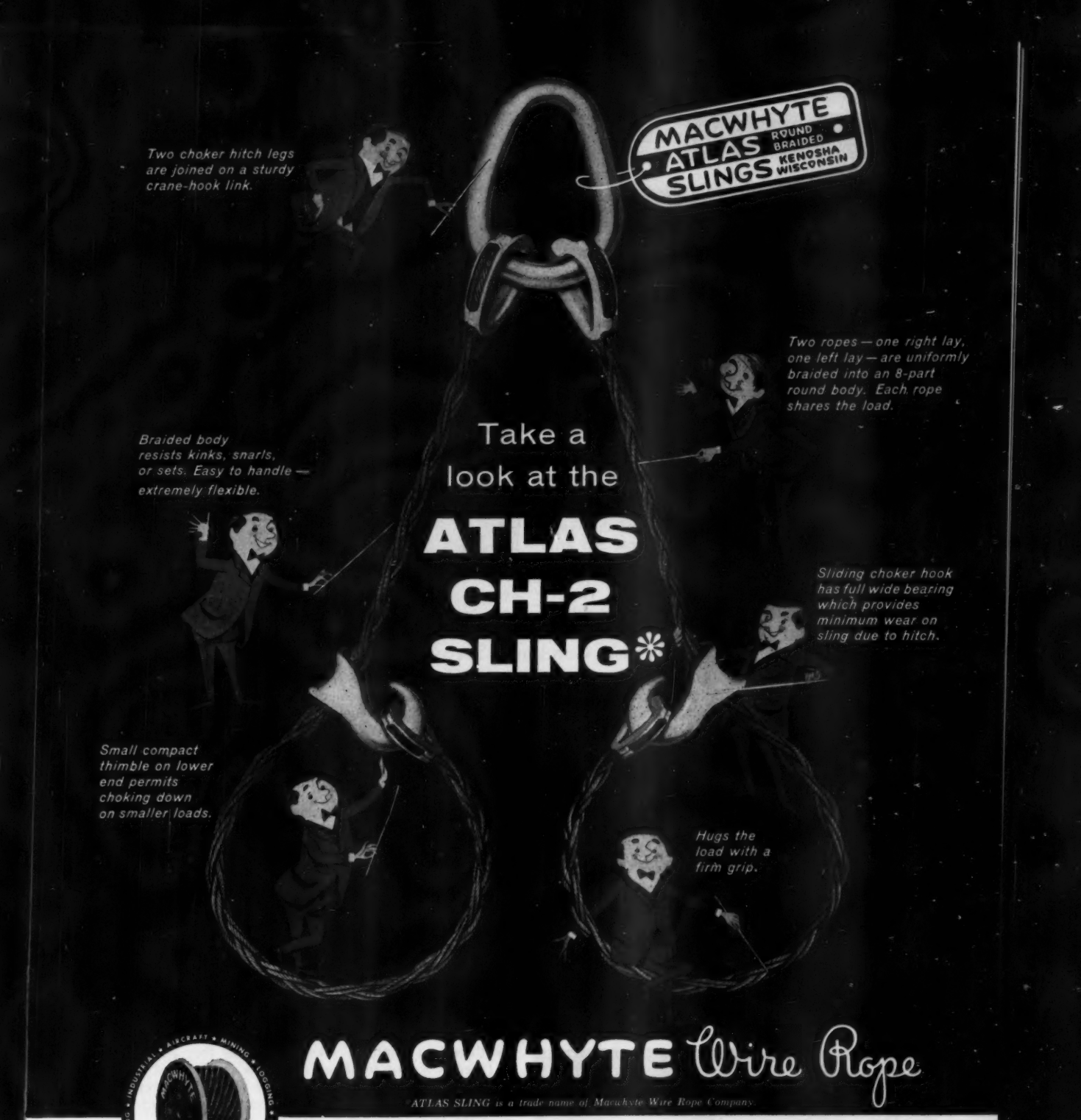
Powder Metallurgy Takes On New Proportions—With Big Beryllium Billet

SLICING THIRTEEN BERYLLIUM reactor plates from one large billet—this outsized job was performed by Brush Beryllium Co., Cleveland, Ohio. The parts required were 13 hexagonal plates, 30 in. high and in varying thicknesses from one inch to two inches. The plates were produced by the hot pressing of high purity beryllium to produce a dense, homogeneous billet.

If pressed individually, each plate would have required a thickness allowance to remove the slightly dished shape resulting from the pressing. Instead, one 2575-lb billet, 36 in. in diameter and 36 in. long, was pressed.

To cut the large billet to size, a Band Mill, manufactured by the DoAll Co., was used. After machining the cylinder into a hexagon, the mill was used to divide the hexagon into three parts for trepanning of holes. The trepanned pieces were then returned to the mill and sliced into the required 13 plates.

Pressing of the plates individually would have required additional machining, as well as the additional material for each plate. It is estimated that more than 1000 lb of beryllium, valued at more than $50,000.00, was saved by band milling the single pressed block.


MACWHYTE
ATLAS
SLINGS
ROUND BRAIDED
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Two choker hitch legs are joined on a sturdy crane-hook link.
Two ropes — one right lay, one left lay — are uniformly braided into an 8-part round body. Each rope shares the load.
Take a look at the
ATLAS CH-2 SLING*
Braided body resists kinks, snarls, or sets. Easy to handle — extremely flexible.
Sliding choker hook has full wide bearing which provides minimum wear on sling due to hitch.
Small compact thimble on lower end permits choking down on smaller loads.
Hugs the load with a firm grip.

MACWHYTE *Wire Rope*

ATLAS SLING is a trade name of Macwhyte Wire Rope Company.

474

Macwhyte Atlas braided slings are readily available in a variety of standard types and assemblies. If you have a *special* load-handling requirement, we will make Atlas Slings to your design . . . or Macwhyte engineers will gladly give you their design recommendation. There's a Macwhyte representative close by. Ask for your free copy of sling circulars 5308R and 5886.

MACWHYTE WIRE ROPE COMPANY

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Manufacturers of wire rope, slings, and cable assemblies. Distributed and stocked throughout United States.

For more facts circle 571 on Reply Card

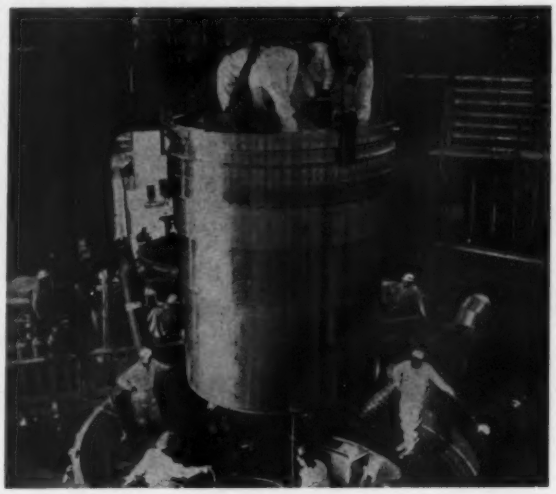
Nuclear Shielding Plug Outweighs the Reactor Vessel It Closes

FABRICATED OF STAINLESS STEEL, with an interior of carbon steel and canned borated graphite shielding to prevent escape of radiation, a 106-ton rotating shield plug has been installed at the Enrico Fermi atomic power plant, Lagoona Beach, Michigan. This plant is America's first full-scale fast breeder nuclear power plant.

The plug, machined to mirror-like finish, acts as the closure for the reactor vessel—whose weight, at 91 tons, is less than that of the plug.

Both the vessel and the plug were built by the Chattanooga Division of Combustion Engineering, Inc., from basic designs supplied by Atomic Power Development Associates, Inc., which is responsible for the development and conceptual design of the nuclear facilities for the plant. The Detroit Edison Co. is building the conventional turbine-generator section which it will own and operate as a commercial unit.

The reactor vessel is 36 ft high, and the plug, which is 9½ ft in diameter, fits into the top 12 ft of the vessel. The plug can be rotated by means of a gear and drive mechanism to help position a fuel-handling device over any of the 639 fuel and blanket elements of the reactor, for removing and installing elements.



Non-nuclear testing of the Enrico Fermi atomic power plant is scheduled to start in mid-1959, and a year of pre-operational nuclear testing begins in September 1960.

Transformer Tank Painting System Combines Spray and Flow Coating

A UNIQUE COMBINATION of spray and flow coating, which provides controlled coverage and complete penetration, is a feature of a new automatic finishing system. Installed at Westinghouse Electric Corporation's new Athens, Ga., distribution transformer plant, the system is used to paint recessed bottom, steel transformer shells with a special wash primer and three-paint-coat method of finishing.

Designed and manufactured by the R. C. Mahon Co., the complete finishing line was laid out to dovetail into the straight-through-flow production line fed by three major areas—tank fabrication, core fabrication and coil production.

The system surface treats, paints and dries the steel covers and miscellaneous parts of the transformers, as well as the steel shells which are later loaded with the required core-coil assemblies. All painting operations are confined in an area of only 240 ft by 50 ft.

Location of the finishing system's 90-ft, three-compartment baking oven on the roof of the plant provided considerable savings in production floor space.

Finishing of the shells revolves about four combination spray-flow coating machines. These include a coating system which Mahon engineers say is the first of its kind; it involves paint application by spray and flow methods simultaneously, and the use of spray coating in areas where pockets of paint are normally left.

The machines were integrated in the installation to handle work in sequence with the line's steady speed of five feet per minute, and to provide consistent coatings of paint film thicknesses that vary less than 0.3 mils from top to bottom of each steel shell.

Shells processed through the finishing line vary in size from 12 to 22 inches in diameter, and 20 inches to four feet in length. Completed shells from the fabricating line are fed on roller conveyor to the loading point of the finishing line, are lifted pneumatically and hooked onto a 2600-ft-long overhead trolley conveyor for transport through the paint spray booths.

All outside and inside surfaces of the shells are coated with wash primer, which is pumped through nozzles onto the work. The shells then travel through a drain tunnel and enter a dry-off oven. From the oven they travel to the three-coat painting section, cooling as they move.

Three flow coat machines take over in the paint area. The first applies the prime coat, the second an intermediate film which includes mica flakes, and the third applies the final transformer gray top coat.

To control paint temperature, a refrigerating unit is used to maintain optimum flow coating level. An automatic viscometer measures and records the paint viscosity at two-minute intervals, adding solvents as required.

Paints and solvents for the machines are premixed in a volatile storage area next to the main building, then pumped to the machines. The mixing system consists of eight agitator-type tanks, each holding 125 gallons. A pump for each of the machines can draw from either of two tanks, so that while paint and solvent are mixed in one, the other delivers paint to the machine.

NO—the board 'em up, brick 'em up or repair ideas just didn't suit. There were too many "buts" about them.
THEY WERE LOOKING FOR:
How did the ABC Company turn 10,000 square feet of window problems into a SAVING of $3,031 a YEAR?
Investigation brought GLASS BLOCKS to the attention of the ABC Company's building group.
They decided to check.
They found out some very interesting things.

Cut Window Maintenance Costs This Book Tells How... It's Free

PC GLASS BLOCK SASH REPLACEMENT has been the once-and-for-all solution to window maintenance problems for hundreds of companies. A new PC book details their composite experience. It shows how and why PC Glass Block panels end sash painting worries and broken panes . . . prevent dust and dirt infiltration . . . cut heating-cooling costs . . . transform harsh daylight into soft, comfortable illumination. Mail the coupon and get your free copy.

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Send me your new booklet on PC Glass Blocks for Sash Replacement.

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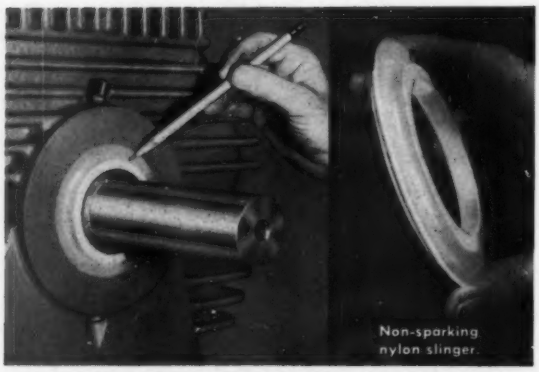
PITTSBURGH PC CORNING

For more facts circle 572 on Reply Card

better protection and better cooling make Elliott C-W SEALEDPOWER MOTORS outstandingly

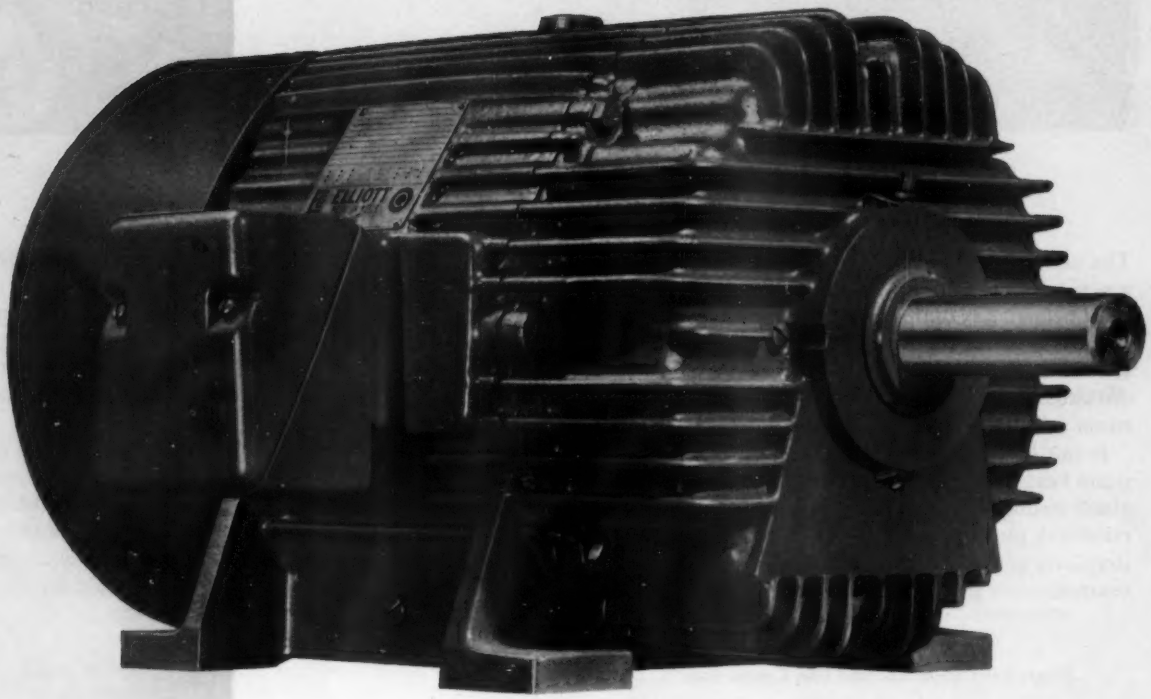
TIGHTLY COMPRESSED GROMMET seals leads where they leave motor frame. Grommet is compressed around numbered leads by pressure ring. No leakage here.



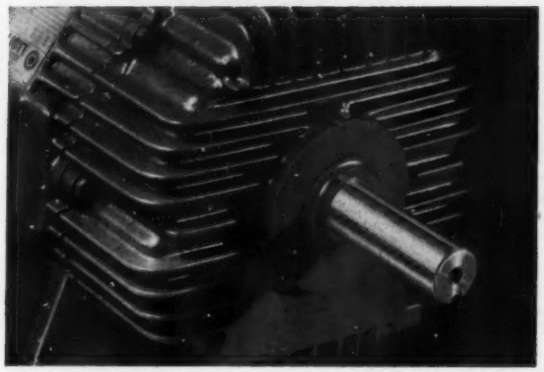
ROTATING SLINGER BANISHES MOISTURE, DIRT that otherwise might creep along shaft and through bearing. Recessed into bracket, it provides long labyrinth-type seal.

IMPORTANT FACTS
about enclosed motors are given in new Elliott Bulletin PB-6000-2. Send for free copy today.

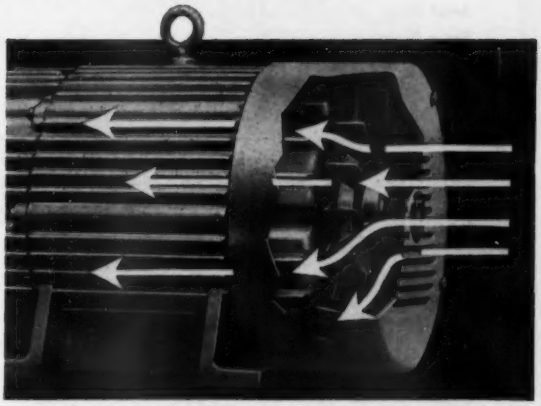
Elliott C-W ribbed-frame enclosed motors, pioneered in the United States by Crocker-Wheeler, include ratings up to 300 hp.



dependable!



MORE AND DEEPER HEAT-RADIATING FINS have greater cooling area. Generous fins over rear bracket keep bearing cool. Non-clogging, easy to clean.



COOLING AIR BLAST FROM EXTERNAL FAN, directed by fan cowl, hugs entire length of motor. Non-sparking fan has keyed and clamped split hub.

ELLIOTT Company

CROCKER-WHEELER PLANT • JEANNETTE, PA.

W9-1

For more facts circle 573 on Reply Card

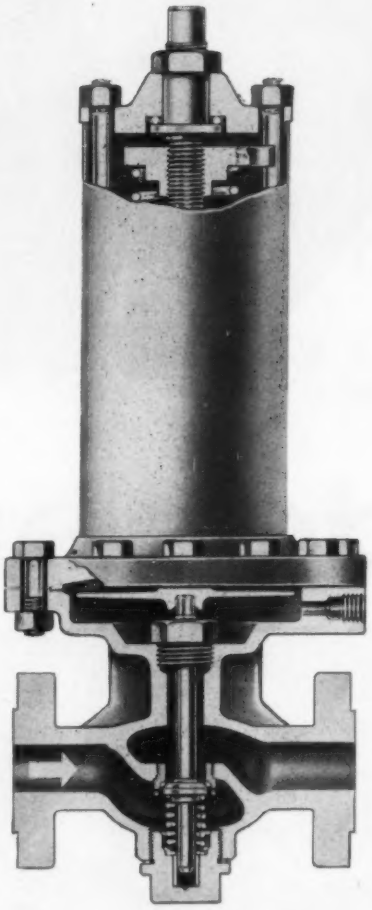
NOW ADDED TO LESLIE's COMPLETE LINE...

TWO NEW CONCEPTS IN

NEW LESLIE-TOPPER® VALVE DESIGNED WITH PILOTING DEVICE ENTIRELY *OUT OF THE PATH OF STEAM*

The new Leslie Topper self-contained pressure reducing valve offers a new level of accuracy, simplicity and low-maintenance service (see chart below). Key to this revolutionary valve is a piloting device which is entirely out of the path of steam. Because this mechanical pilot is sealed-off from the steam and all valve parts are designed without dirt-catching passages, the new Topper valve is ideal for both poor steam conditions and intermittent duty.

It can handle low-reduced pressures and is used in process lines, steam heat reducing stations and for make-up steam supply to heaters, gland sealing system and process equipment. You benefit from added reliability, plus the accuracy of a pilot operated valve and the rugged simplicity of direct operation. It means less shut-down time for maintenance, surer pressure control and increased plant efficiency.



SPECIFICATIONS

Sizes, Body Materials and End Connection:
½—2", cast iron, and bronze, screwed, 150 and 300 lb. bronze, flanged.
1—2" 125 and 250 lb. cast iron, flanged bodies.

Three Spring Ranges: *2-10 psi; 5-20 psi; 15-35 psi.*

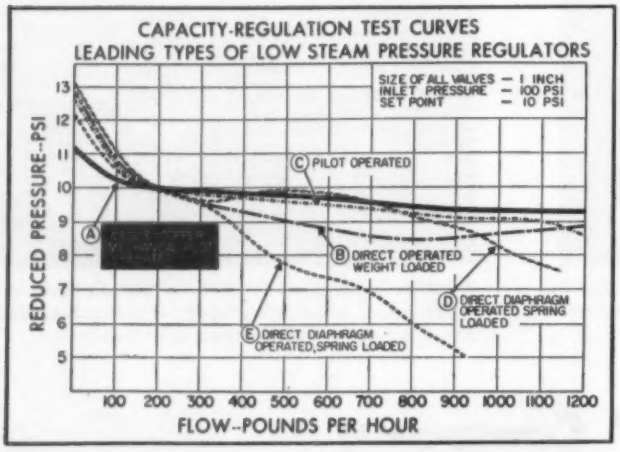
Long-travel metal diaphragm: *2 ply, phosphor bronze, Spiro-flex.®*

Main Valve: *Hardened 440C stainless steel.*

Seat Ring: *Stellited stainless steel.*

Stem Guides: *Gun metal bronze (top and bottom guided).*

Main Valve Spring: *Inconel.*



For sizing and capacity data, contact your Leslie Engineer or write for Bulletin 582.

LC-8

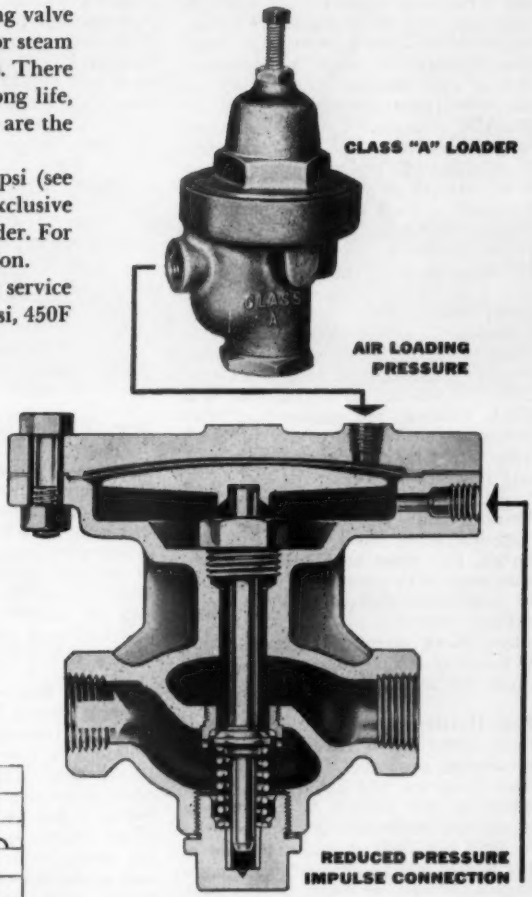
PRESSURE REDUCING VALVES

LESLIE AIR-LOADED REDUCING VALVE GUARANTEED MAINTENANCE-FREE FOR THREE FULL YEARS

New Leslie air-top GPK diaphragm operated, pressure reducing valve is guaranteed maintenance-free for three full years. Designed for steam heat or process steam application, it has only two moving parts. There are no seals, no stuffing boxes, no small dirt catching parts. Long life, long-travel diaphragm and hardened stainless steel main valve are the only parts that move.

You get accurate response even to flow changes as small as 0.1 psi (see chart below). This exceptional responsiveness results from exclusive diaphragm design and the accuracy of the simple Leslie air loader. For added flexibility, pressure can be adjusted from remote location.

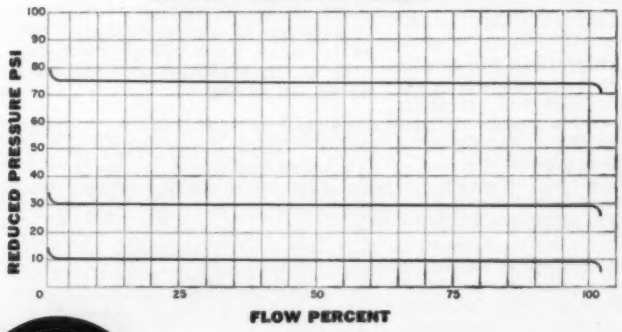
Especially desirable for poor steam conditions and standby service requirements, the GPK is suitable for steam service up to 250 psi, 450F and is available in ½" to 4" sizes.



SPECIFICATIONS

Sizes: *½ to 2", cast iron or bronze, screwed ends. 2½, 3 and 4", cast iron, 125 or 250 lb. flanged.*
Main Valve: *Hardened 440C Stainless Steel.*
Seat Ring: *Stellited Stainless Steel.*
Stem Guides: *Gun Metal Bronze (top and bottom guided).*
Main Valve Spring: *Inconel.*
Inlet Pressure Range: *0-250 psi, 450°F.*
Reduced Pressure Range: *0-85 psi with Class A loader, up to 249 ½ psi with any suitable high pressure loader.*
Minimum Pressure Drop across Valve: *½ psi.*
Available with manual opening device in sizes ½—1¼".

CAPACITY-REGULATION GRAPH



For sizing and capacity data, contact your Leslie Engineer or write for Bulletin 561-B.

TRADE LESLIE MARK

REGULATORS and CONTROLLERS

Leslie Co., 457B Grant Avenue, Lyndhurst, New Jersey

Over 275 Factory-Trained Engineers At Your Service—Nationwide!

For more facts circle 574 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Salinas, Calif.—Nestle Company, Inc., 2 Williams St., White Plains, N. Y., plans to construct a plant here for the production of company products. Plant will cost about $5 million and will be a four-story brick, concrete and steel structure. Work has already begun on the new facility and completion is scheduled for late next year.

San Francisco, Calif.—Tidewater Oil Company, 79 New Montgomery Street, has announced that a group of oil companies plans to build a $6-million cycling and desulfurization plant on the new Hope Smackover Field, in Franklin County, Texas. Tidewater will operate the plant for the group. New plant will process 50 million cu ft of natural gas per day, removing components such as propane, butane, distillate and sulfur and other elements. Work on the facility will begin soon for completion by late 1961.

Santa Barbara, Calif.—Raytheon Manufacturing Company, Waltham, Mass., plans a wholly integrated electronic warfare center at its plant site here. Center is planned to tie together in a single location, the engineering, marketing and production of the division's wide-spread interests in electronic military devices.

Vernon, Calif.—Aluminum Company of America, 1200 Alcoa Building, Pittsburgh, Pa., plans to install an extrusion press with a capacity of 5200 tons in local plant here, as part of a $5-million expansion program at this facility. Work on the big press is slated to begin at once and is scheduled to be ready for production early in 1960.

East Hartford, Conn.—United Aircraft Corp. plans major expansion and improvement program of company facilities. Program will involve an expenditure of $68 million to expand and modernize company's present facilities in 1959 and 1960. A major portion of the money will be devoted to the company's Connecticut plant. Of the total, $39 million will be spent on research and development facilities and $29 million for production facilities.

Old Saybrook, Conn.—R. R. Donnelley & Sons Co. plans to construct a plant here for the printing and distribution of "Life" magazine in the northeastern states. The new building will cover an area of 125,000 sq ft. Construction will begin at once and building is scheduled for completion by late 1961. Company's investment in plant, property and equipment will exceed $8 million.

Chicago, Ill.—Victor Chemical Works, Inc., 155 N. Wacker Drive, this city, plans to construct a new facility for the production of elemental phosphorous, phosphates and other chemicals, on a 35-acre waterway site here. The phosphorous acid facility will be the first stage in the construction of a bulk chemical plant, to be completed on the site.

Baton Rouge, La.—Noralyn Paper Mill Corp., this city, plans to construct a 400-ton per day newsprint and semi-chemical pulp plant on a 750-acre tract of land acquired for the purpose at Beuche, La. Project, reported to cost in excess of $35 million, will be the first mill to produce high quality newsprint and pulp exclusively from hardwood timber. Ferguson Company, 1783 E. First St., Cleveland, O., will be in charge of the design and construction of the project.

Lake Charles, La.—Continental Oil Company, P.O. Box 2197, Houston, Texas, plans to install a catalytic reforming unit at its refinery located here. Work will get under way at once for scheduled completion by the end of this year. Cost of the new facility will be in excess of $3 million.

New Orleans, La.—Bestwall Gypsum Company, 129 E. Lancaster Ave., Ardmore, Pa., plans to construct a plant here, as part of a major expansion program begun last year. Plant will be built to process 200,000 tons of gypsum rock annually and is scheduled to go into production by mid-1960. Plant's products will include plaster, lath and gypsum board. Cost of the new facility is reported to be approximately $5.5 million.

Baltimore, Md.—Chevrolet Division of General Motors Corp., General Motors Building, Detroit, Mich., plans major additions to company's Chevrolet and Fisher Body Division plants located here. Chevrolet will add about 850,000 sq ft and Fisher Body will acquire about 170,000 sq ft of additional working area. Construction will get under way in the fall of this year for completion by spring of 1962. Cost reported to be a multi-million project.

Springfield, Mass.—Dow Jones & Company, Inc., 44 Broad St., New York 4, N. Y., plans to construct a printing plant on an 11.5-acre plot in the city of Chicopee, Mass. Preliminary engineering work is already under way and work on the new plant will begin soon. It will be of the garden type variety due to its country location and will cost approximately $3 million when completed by mid-1960.

Holland, Mich.—Parke-Davis & Company, Joseph Campau Ave. at the River, Detroit, Mich., plans to construct a chemical manufacturing facility on large building site located here. Company has named Darin & Armstrong Co., Detroit, Mich., as general contractor for the construction of the $7-million facility. Company, engaged in the manufacture of pharmaceuticals, surgical and biological products, will get new project under way at once with the completion date scheduled for late 1960.

Jackson, Mich.—Aeroquip Corp., 300 S. East Ave., plans a major expansion program of company facilities over an 18 month period. Program will provide an additional 140,000 sq ft of work area. Included are a new and larger plant for the Elbeeco Division here and a plant addition to be built at company's industrial division at Van Wert, O. A special laboratory for testing products used on rockets and missiles is also planned for construction at this site.

Quincy, Mich.—General Cable Corp., 420 Lexington Ave., New York, N. Y., plans to build a wire and cable plant on large building site here. Construction of this $3-million plant will get under way at once and will have a working area of 60,000 sq ft plus administration facilities.

Saginaw, Mich.—Saginaw Steering Gear Division of General Motors Corp., 3900 Holland Rd., has authorized an expansion program of facilities located here. Plans call for a 236,000-sq ft addition to the present plant at a cost in excess of $2 million.

Fords, N. J.—Heyden Newport Chemical Co., 342 Madison Ave., New York, N. Y., will begin construction soon on a new plant for the production of maleic anhydride and fumaric acid, chemicals used to make alkyd and polyester resins. Alkyds are used in paints, while polyesters are used in the manufacture of reinforced plastics, like fibrous glass. Work will get under way soon and is scheduled for completion by the fall of 1961.

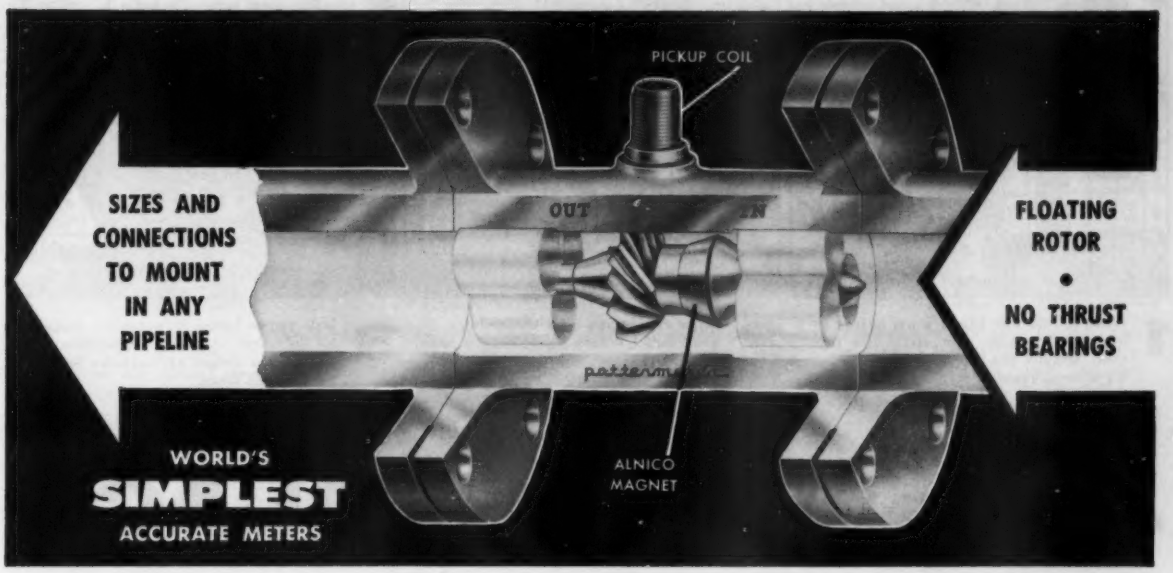
Paterson, N. J.—Treplow Products, Inc., 59 Camden Street, Paterson, N. J. is constructing a large facility in West Paterson, N. J., which will more than triple company's present over-all capacity of the production of alkyl aryl sulfonates, alkyl sulfates, alkanolamides, petroleum sulfonates, ethoxylated sulfates and organic acids. New facility will be producing these items by late 1960.

Saratoga Springs, N. Y.—General Foods Corp., 250 North Ave., White Plains, N. Y., plans to construct a facility here for the production of printed folding cartons for the company's Birds Eye and Jell-O Divisions. Work on the new building has just begun, and is scheduled to be in pro-

(Continued on page 276)

pattermeter BOWSER ESTABLISHED 1885 **0.1 GPM TO 40,000 GPM**

ELECTRONIC TURBINE TYPE METERS



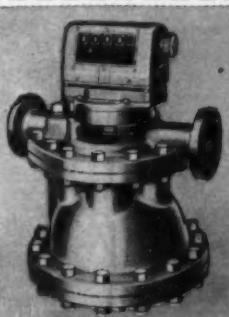
for PETROLEUMS • CHEMICALS • FOODS PHARMACEUTICALS • INDUSTRY LIQUIDS

A magnet built into the turbine driven rotor generates electric current directly proportional to the flow rate of liquid in the pipe. This impulse is used to activate electronic control and readout equipment near the meter or at remote locations. Accurate over wide range of flow rates and pressures. Handles liquids and gases.

Flow Ranges	to 40,000 g.p.m. and more
Operating Pressures	Unlimited
Temperature Ranges	−455° F. to +1500° F.
Pressure Drop	Virtually Nil
Connections	No limitation
Construction (standard)	Type 316 stainless steel with Carpenter #20 Rotor

READOUT and CONTROL equipment as needed

Potter-Bowser engineers gladly confer with systems engineers to provide data on any application requirements.



BOWSER XACTO METERS

BOWSER XACTO METERS AND PROPORTIONERS

positive-displacement piston type

Wherever mechanically driven readout and control equipment is indicated, and where positive-displacement metering is needed or costs less, Bowser Xacto Meters (leading all others in industry) are unexcelled for dependability and accuracy. Capacities: 6 GPH to 250 GPM

Xacto Meter equipped proportioners are used to blend two or more liquids in continuous flow at accuracies to ½ of 1 percent. First in lube oil blending. Bowser proportioners also handle most other liquids used by process industries.

BOWSER PROPORTIONING BLENDERS

Write For Catalog

Potter-Bowser Division BOWSER, INC. Fort Wayne, Indiana

For more facts circle 576 on Reply Card

When unit heaters are "over-the-hill,"

Been wondering when this relic would quit on us. Well—let's haul 'er down . . . maybe we can patch that leak.
W-h-e-w! Wama job! For a while there I thought we'd have to blast it loose.
No wonder it leaks . . . looks like something dredged up from Davy Jones' locker. This coil is really corroded.

1 When an old unit heater starts to leak, it's almost a sure sign useful life is over. Repairs are usually a waste . . . it's wiser to replace.

2 Major repairs are time consuming . . . and costly. What's more, once a leak appears, chances are additional leaks will soon crop up.

3 Unit heater failure is generally caused by corrosion. And it's *impossible* to inspect the extent of corrosion *within* heating coil tubes.

. . . it pays to REPLACE

HORIZONTAL — Can be direct-from-pipe suspended . . . without other supports. Vertical louvres may be added for complete directional control. Available in 24 sizes.

POWER-THROW® — For hard-to-heat locations. High-velocity discharge assures exceptionally long heat-throw . . . up to 140 feet. Ten sizes.

VERTICAL — Made in 28 sizes . . . choice of 4 air deflectors. Depending upon size selected, mounting height may vary from 10 to 60 feet.

PROPELLER-TYPE GAS-FIRED MODINES feature direct-fired contoured tubes, clog-proof burners, corrosion-resistant metals. Eight sizes . . . 25,000 to 310,000 Btu.

In Canada: Sarco Canada, Ltd., Toronto 8, Ontario

repairs are a waste of time and money . . .

Well, I've done all I can for you. Here's hoping it was worth it.
Wouldn't you know . . . and on the coldest day of the year! Never should have tried to save it.
This new Modine is a beauty, Joe. We should have done this in the first place.

4 Because no one can foretell where or when the next leak will occur, repairs only prolong the unit's life for an *unpredictable* length of time.

5 Unit heater failures often interrupt production. Well-planned replacement avoids this . . . units can be replaced in summer and early fall.

6 Replacement with new Modines ends danger of shutdowns, expense of frequent repairs. And you'll find new Modines heat better, use less fuel.

with new Modines

One little leak can mean the start of skyrocketing maintenance costs. In *time* alone, it costs from $25 to $300 to disconnect, take down and re-install an "old-age" unit heater . . . depending on size, type and mounting height. Add the actual repairs — and the final cost is prohibitive. In addition, a leak is a sign that the unit is weak in other places. New leaks will probably develop soon . . . and with increasing frequency.

A planned replacement program can avoid costly production delays. Service records show that most unit heater failures occur during coldest weather . . . interrupt production at critical times. With a well-planned replacement program, failures can be anticipated. Units can be replaced in fair-weather months without hampering production.

In some plants, units are *automatically scheduled for replacement* after they have been in service for a pre-determined number of years . . . usually after they have been depreciated on the company's books.

A Modine replacement program offers many cost advantages. In teaming with Modine to establish your own replacement program, you avoid production stoppages and frequent (often useless) repairs. Also, you get the many benefits of new Modine efficiency.

Modine motors are designed for lower power consumption. Sealed-in bearings eliminate need for periodic lubrication. Vertical fins discourage accumulation of dirt, lint and other materials. Other features include improved structural strength and durability, quieter operation, lighter weight. They add up to low-cost maintenance, better heating performance, greater fuel economy.

COMPLETE REPLACEMENT PROGRAM DATA! See your Modine distributor or use the coupon to get (1) full information on replacement program, (2) 22" x 24" wall chart containing unit heater maintenance tips and a valuable performance check list, (3) Modine's "Repair or Replace?" bulletin, (4) Gas Unit Heater Installation Guide.

IMMEDIATE DELIVERY FROM LOCAL STOCK! Modine wholesalers are located in all principal cities. Call the Modine representative nearest you . . . he's listed in the yellow pages.

Modine®
MANUFACTURING COMPANY

MODINE MANUFACTURING COMPANY
1563 DeKoven Ave., Racine, Wisconsin

Send full data on replacement program ☐; wall chart and "Repair or Replace?" bulletin ☐; Gas Unit Heater Installation Guide ☐.

NAME .....

FIRM .....

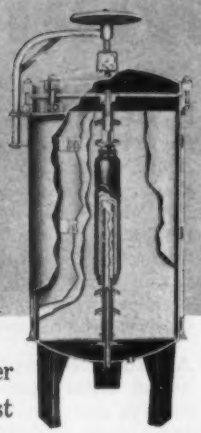
ADDRESS .....

SU-1399

For more facts circle 577 on Reply Card

CFC HONAN-CRANE HYDRAULIC FILTER lowers operating costs on Injection Molding Presses

At Leaf Plastics, Inc., Yonkers, N. Y. this portable CFC Honan-Crane Bulk Type Filter purifies the hydraulic oil on nine injection molding presses.



Leaf Plastics, Inc., prolongs the life of their injection molding presses by reducing wear on precision fitted moving parts through the use of CFC Honan-Crane Hydraulic Filters. They enjoy definite dollar savings in reduced down time, maintenance and increased productive man-hours.

The CFC Honan-Crane Bulk Type Filter is used on each machine periodically. Oil is recirculated from the hydraulic sump through the filter to remove all harmful contaminants.

CFC Bulk Type Filters offer complete protection against contamination of practically all types of oils. Two filter media are available — cellulose for removal of suspended solids and Cranite (fuller's earth) for removing products of oxidation.

CFC Filters are engineered to your job requirements — for high filtration efficiency at low cost. For technical literature or engineering assistance, *write to Department PG.*

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

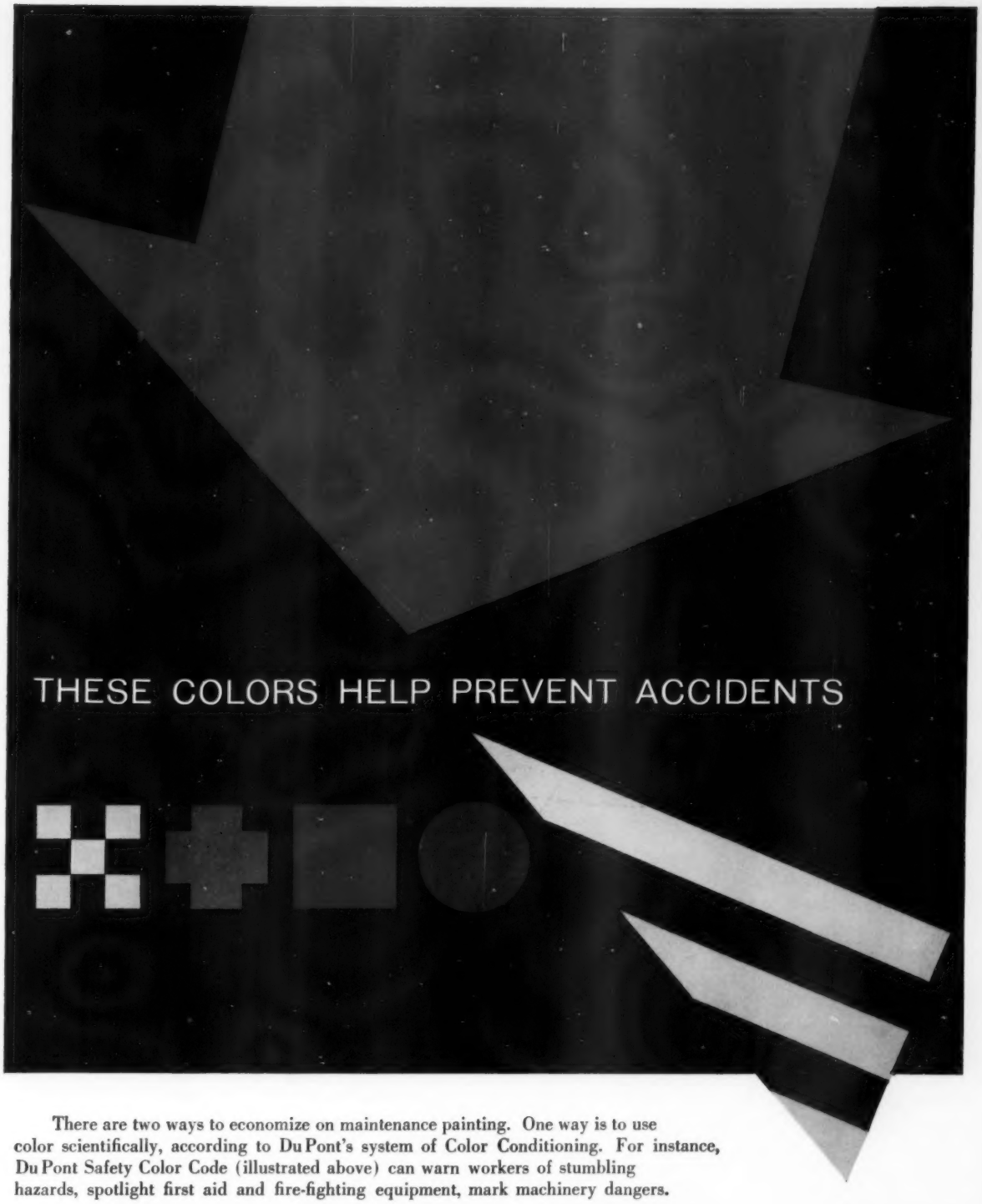
MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 578 on Reply Card

For more facts circle 579 on Reply Card →



There are two ways to economize on maintenance painting. One way is to use color scientifically, according to Du Pont's system of Color Conditioning. For instance, Du Pont Safety Color Code (illustrated above) can warn workers of stumbling hazards, spotlight first aid and fire-fighting equipment, mark machinery dangers.

Another way is to use good quality paint. Du Pont Paints are an outstanding example. They're tough, durable and right for the job.

A complete plan of Color Conditioning for your plant and technical help on paint problems are yours for the asking. So is our booklet, "How to Put Color to Work." Write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. PE-99, Wilmington 98, Del.

DU PONT

Better Things for Better Living
...through Chemistry

DU PONT COLOR CONDITIONING PAINTS

THE U. S. TREASURY SALUTES THE CHEMICAL INDUSTRY

—and its people who buy Savings Bonds and strengthen America's Peace Power

Every family and every industry in this country benefit, directly and indirectly, from the work of our great chemical industry. Those whose lifework is in chemistry may well take pride in the vast good that stems from their profession. Thousands upon thousands of people in the chemical field are proud, too, of their share in America's Peace Power, for they are making regular purchases of U.S. Savings Bonds.

Buying Shares in America through the Payroll Savings Plan is a convenient and systematic way to practice thrift. It helps these patriotic people enhance their resources for home building, for education and for greater security after retirement.

If your company has not yet installed a Payroll Savings Plan, start at once. The easy first step is to telephone your State Savings Bond Director for the help he will give you, gladly. Or write to Savings Bonds Division, U.S. Treasury Department, Washington 25, D. C.

JAMES C. VICKERS is pictured here practicing his highly specialized skills in one of our country's great chemical plants. Mr. Vickers is typical of the thousands of expert workers in this field who are buying U.S. Savings Bonds regularly. Mr. Vickers uses his company Payroll Savings Plan to make regular contributions to the Peace Power of his country.

PLANT ENGINEERING

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Hundreds of good reasons why Clark "PM" Relays are worth waiting for

The word is out about the most complete, integrated line of control relays available today.

If your shipment of Clark "PM" Relays has been delayed, please be patient. There's a very good reason. Seems like *everybody* wants them.

It all began when Clark first announced the completion of a *full line* of "PM" Relays. We were literally snowed under by an avalanche of orders.

We're happy to report, however, that our manufacturing facilities have been expanded to meet the demand and we're rapidly catching up—even though the avalanche continues.

Is it any wonder when you consider the many advantages the Clark "PM" Relay line offers: modular construction that makes possible integrated uniformity, compactness and flexibility . . . neater, more uniform panels . . . the greatest possible use of every square inch of valuable space.

Is it any wonder also, when you consider that *every* relay in the Clark "PM" line is manufactured with the same careful attention to detail that has long made Clark *"the standard of quality"* for industrial control.

No time-saving production short cuts are worth sacrificing this quality, even in the face of the tremendous demand created by customer preference. In fact, we're sure our customers wouldn't have it any other way.

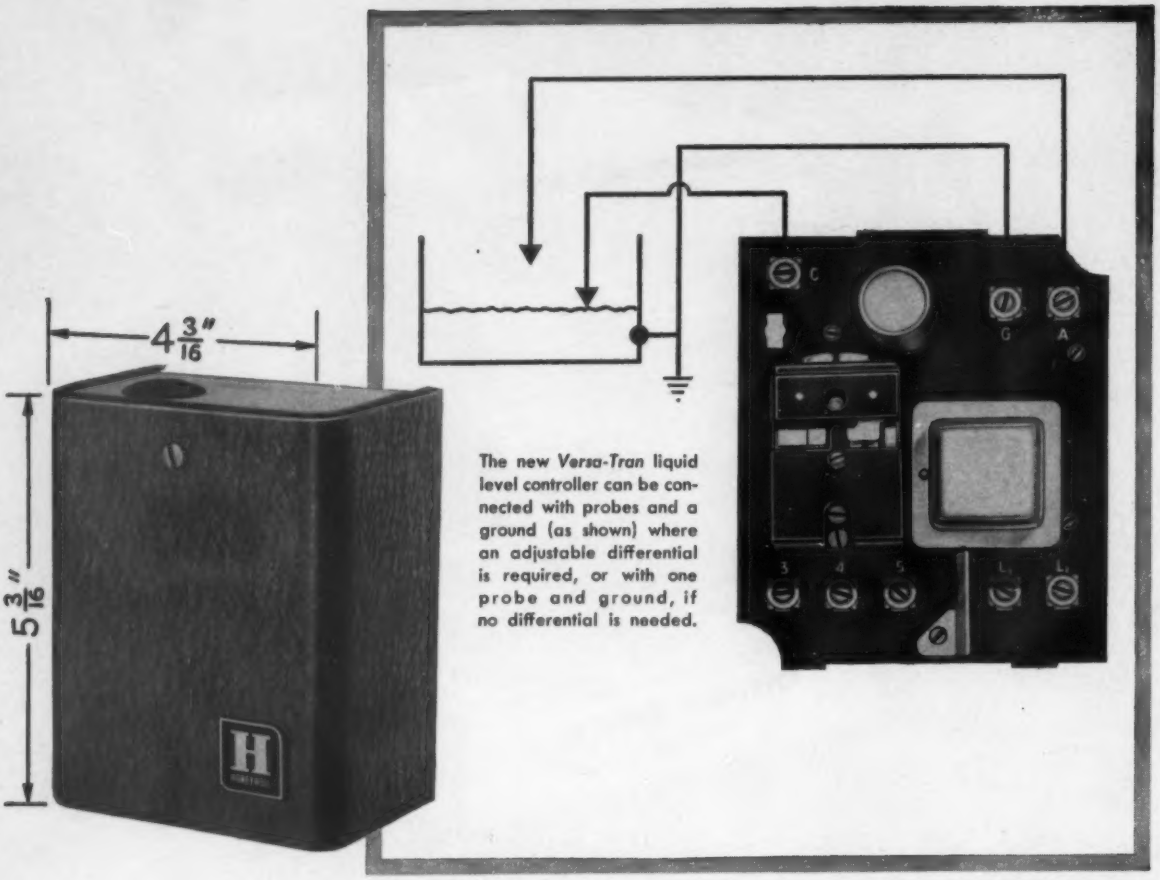
Your Clark Controller sales representative or distributor will be glad to give you more reasons why Clark "PM" relays are your best control relay buy—well worth waiting for. Contact him or write direct to Clark Controller. 9R2

The **CLARK CONTROLLER** *Company*

Everything Under Control • 1146 E. 152nd St. • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 581 on Reply Card



The new *Versa-Tran* liquid level controller can be connected with probes and a ground (as shown) where an adjustable differential is required, or with one probe and ground, if no differential is needed.

New low cost, high precision VERSA-TRAN® simplifies liquid level control

Here's a simple, easily-installed electronic controller that accurately controls the level of any electrically conductive liquid with a measured impedance not exceeding 25,000 ohms, measured at the probe-type sensing element. Its features include:

- Unique, fully transistorized design which eliminates need for field adjustment and calibration.
- Choice of fixed or adjustable differential by use of either one or two probes.
- Wiring between relay and probes can be ordinary 18 gauge, 2-conductor cable.
- No floats or standpipes necessary.
- Relay can be flush mounted, surface mounted or mounted in most electrical enclosures.
- All components zinc-chromate treated for corrosion resistance.

Your nearby Honeywell field engineer can help you profitably apply the new *Versa-Tran* liquid level controller. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

H HONEYWELL *First in Control*

STOCKPILING: Piling up coal reserves in Milwaukee. AMERICAN 300 Series Crawler Crane.

SWITCHING: Moving gondolas, loading steel wire in Illinois. AMERICAN DiesELectric Locomotive Crane.

YARD DUTIES: Sorting steel of all shapes and sizes in St. Paul. AMERICAN 300 Series Self-propelled Crane.

UNLOADING: River traffic flows steadily in St. Louis. AMERICAN 700 Series Pedestal Crane.

WHY NOT PROFIT BY THE EXPERIENCE OF OTHER AMERICAN CRANE OWNERS!

One of the most respected, most reliable names in the materials handling equipment field, American Hoist has earned a leading reputation for developing superior load moving machinery. Owners and operators of American cranes can depend on their "years-ahead" engineering features to provide them with efficient load lifting services. Their acceptance of American dependability and versatility is just one more reason why you'll see American cranes in use by more and more of the nation's top industrial firms.

If expensive, single-duty equipment sits idle in your yard, now is the time you should fully examine the potential of multi-purpose American cranes. They can cover a wider variety of jobs than almost any other machine you own. Handling loads of all shapes and types, American cranes are tailor-made for almost every job in your plant or yard. With interchangeable fronts . . . hooks, grapple, clamshell, dragline, shovel or magnet . . . the demands of every industry are met by a complete line of American Cranes. Based on the experience of other American owners and operators, Americans are job tested . . . job proven . . . job ready . . . to help you cut your material handling costs.

Send for free detailed and illustrated catalog information on American Cranes best suited for your requirements . . . crawler, rubber, pedestal, or rail mounted.

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons
DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

AMERICAN HOIST AND DERRICK CO.
Dept. PE, St. Paul, Minnesota

Please send me complete catalog information on American cranes, FREE.
☐ Truck ☐ Self-propelled
☐ Crawler ☐ Locomotive ☐ Pedestal

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Firm_____
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City_____ State_____

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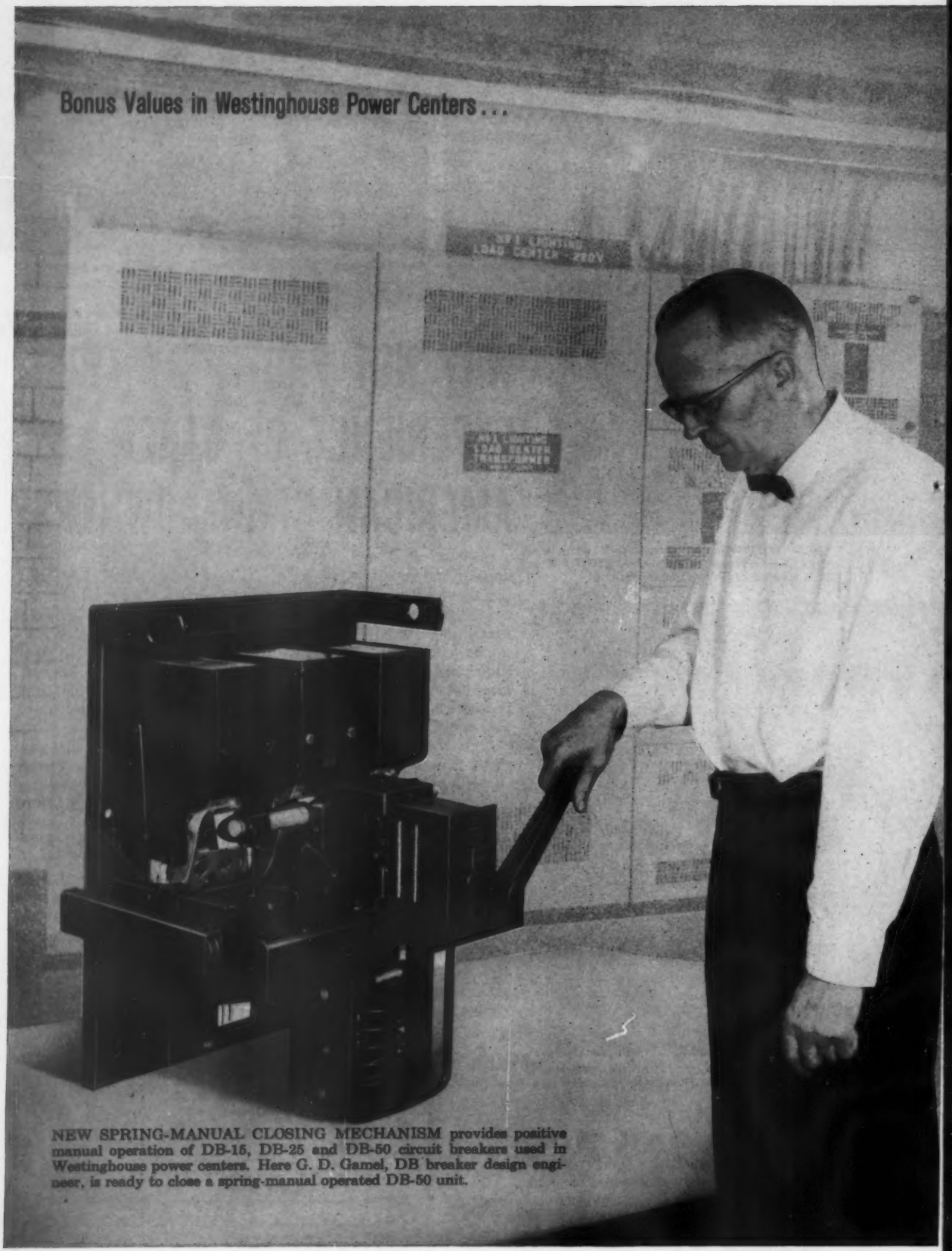


NEW SPRING-MANUAL CLOSING MECHANISM provides positive manual operation of DB-15, DB-25 and DB-50 circuit breakers used in Westinghouse power centers. Here G. D. Gamel, DB breaker design engineer, is ready to close a spring-manual operated DB-50 unit.

Westinghouse power centers offer greatest component selection... plus new switchgear insulation

You Can Choose the Breaker Operation You Need. Low-voltage air circuit breakers (DB-15, DB-25 and DB-50) provided in Westinghouse power centers are now available with a choice of manual, spring-manual or electric closing mechanisms. In accordance with industry standards, DB-75 and DB-100 breakers are available with an electrically operated closing mechanism only.

You Can Choose the Transformer You Need. As with breaker closing mechanisms above, Westinghouse gives you complete freedom of choice in selecting the power center transformer best suited to your application. Within code limitations, you can choose *oil-filled* for outdoor service . . . *Inerteen®-filled* for outdoor or indoor service where a nonflammable, liquid-cooled transformer is desirable . . . *ventilated dry-type* for maximum safety and minimum maintenance under controlled atmospheric conditions, indoors . . . and *sealed dry-type* for complete safety and virtually no maintenance, under adverse atmospheric conditions, indoors or outdoors.

New Westinghouse Insulation of improved glass polyester material is used for bus supports and short circuit bracing in Westinghouse low-voltage metal-enclosed switchgear. In addition to being highly track resistant, this new insulation is also flame retardant, and the design of supports and bracing provides increased vertical creepage distances. Result is maximum safety with minimum maintenance.

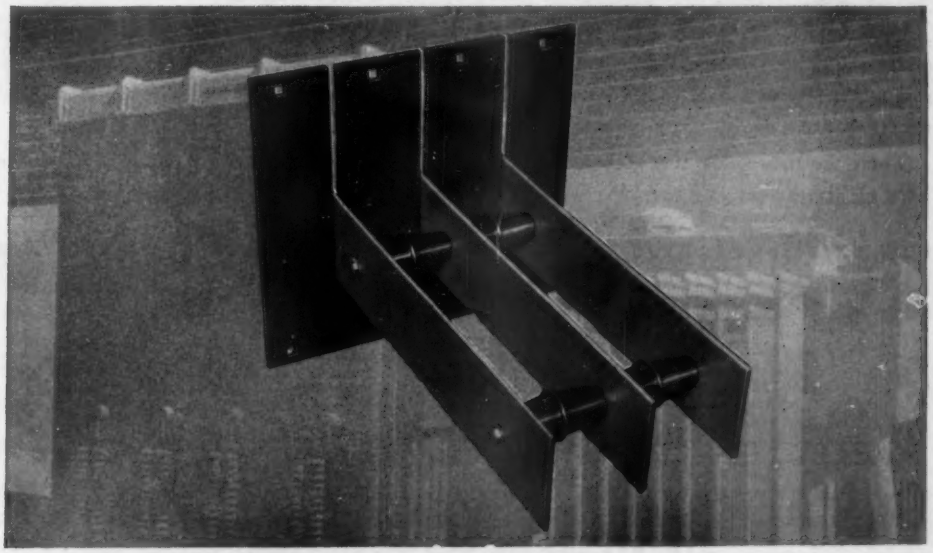
These features are only a few of the continuing product improvements that provide true bonus values beyond specification in Westinghouse power centers. For complete details, call your Westinghouse representative—or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60979

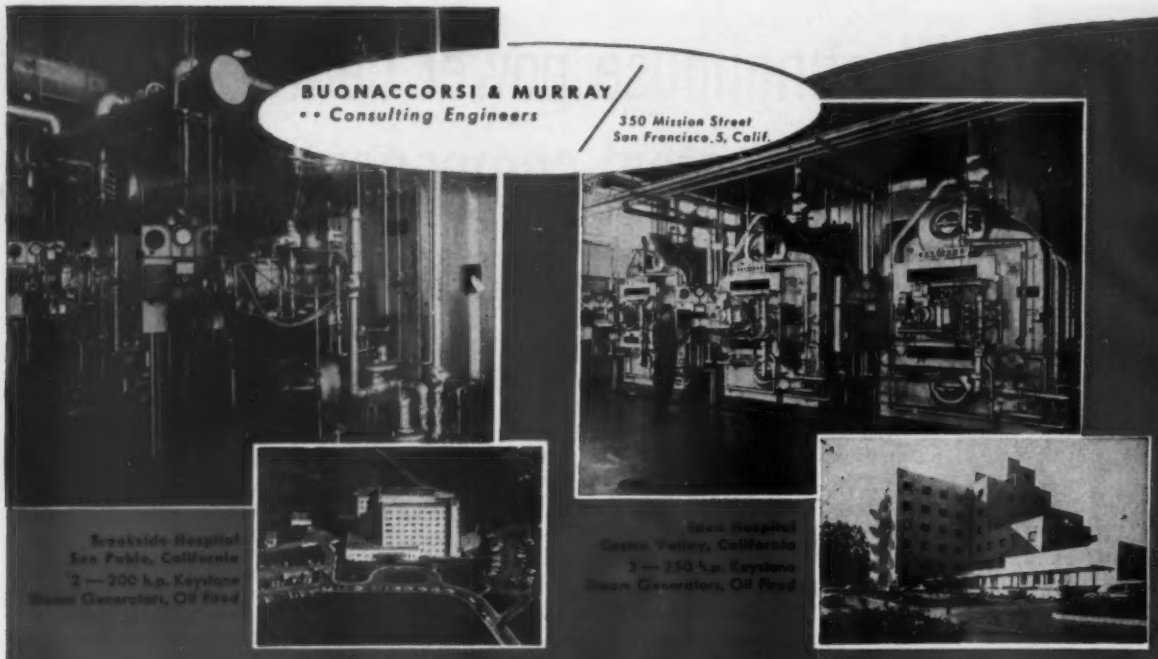
YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

NEW WESTINGHOUSE GLASS POLYESTER INSULATION is used for bus supports and bracing in low-voltage metal-enclosed switchgear of Westinghouse power centers.



For more facts circle 584 on Reply Card



Professionals choose ERIE CITY KEYSTONE STEAM GENERATORS

● Consulting Engineers and their staffs are actively engaged in selecting and coordinating the most dependable equipment available. We are proud of the confidence they have placed in Erie City.

Built-in quality is the backbone of confidence — and hundreds of Keystone Steam Generators are in service today because they incorporate proven quality design features.

Design features such as tangent furnace and outer wall tubes plus double steel encased insulation keep outer casing cool to the touch. The top smoke outlet eliminates the inconvenience of a hot stack in the aisle, minimizes required floor space and reduces building costs. Keystones have no baffles or headers which generally are a source of troublesome maintenance.

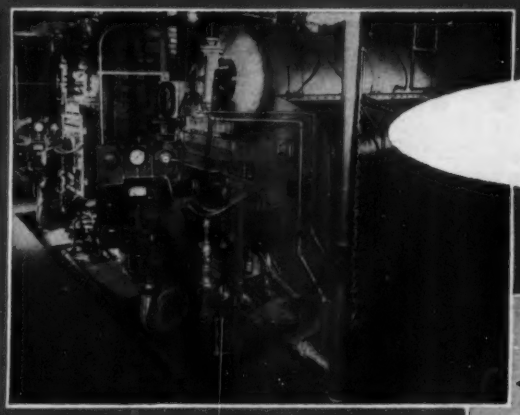
These features and many more have proved the Keystone to be a safe, highly efficient steam generator with plenty of reserve power. Write for our comprehensive Bulletin SB-5993-J.

LOW EXIT TEMPERATURES AND HIGH EFFICIENCIES ARE STANDARD WITH THE KEYSTONE

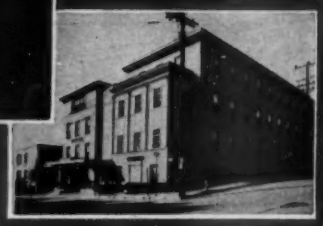
You can depend on ERIE CITY *Since 1840* *for sound engineering*

ERIE CITY IRON WORKS · Erie, Pa.

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
WASTE HEAT BOILERS • FIRE and WATER TUBE PACKAGE BOILERS
OIL and GAS BURNERS • STOKERS • PULVERIZERS



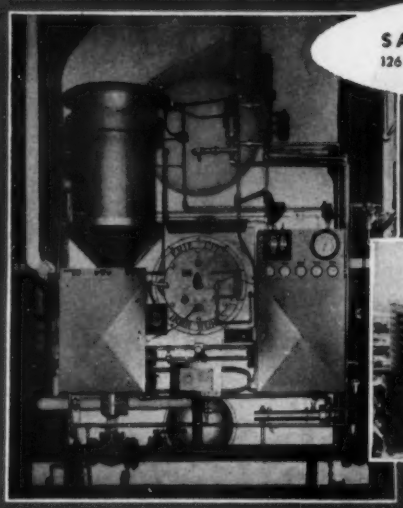
ELWOOD S. TOWER
CONSULTING ENGINEER
311 INVESTMENT BUILDING
PITTSBURGH 22, PA.



Rochester General Hospital
Rochester, Pennsylvania
2—150 h.p. Keystone Steam
Generators, Oil and Gas Fired

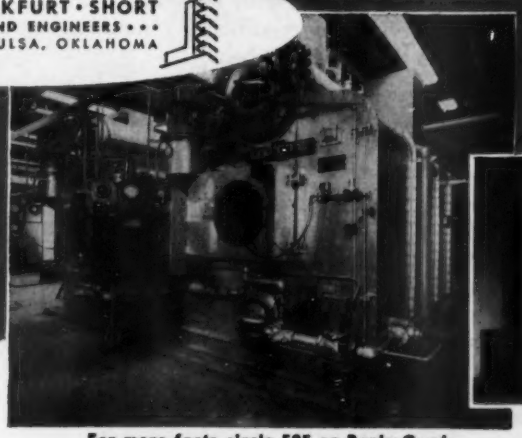
Architect—Arthur Ziegenfelder & Associates
New Brighton, Pennsylvania

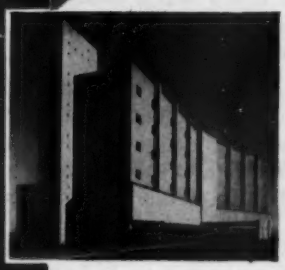
SANFORD AND DUDLEY
126 Carondelet Street • New Orleans, Louisiana
CONSULTING ENGINEERS



Charity Hospital
New Orleans, Louisiana
1—800 h.p. Keystone Steam
Generator, Oil and Gas Fired

COSTON • FRANKFURT • SHORT
• • • ARCHITECTS AND ENGINEERS • • •
OKLAHOMA CITY, TULSA, OKLAHOMA





Baptist Memorial Hospital
Oklahoma City, Oklahoma
2—[illegible]0 h.p. Keystone Steam
Generators, Gas Fired

For more facts circle 585 on Reply Card

the most important thing to look for in drills is the word SKIL on the nameplate!

Skil is the mark of a drill that will do the job it was bought to do . . . a drill with something extra in the "built-for-keeps" department . . . a drill with beefed-up bearings, gears and switches for fewer breakdowns and next-to-nothing maintenance costs . . . a drill with power to spare when the going gets heavy.

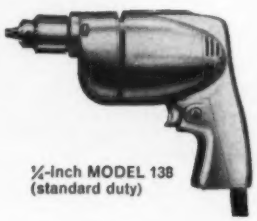
The only question is *which* Skil drill best meets your specific drilling need.

Skil makes as broad a range of models as you'll find . . . from compact, powerful ¼-inchers up to ¾-inch and 1-inch "big jobs." Close to 100 specialized accessories greatly multiply their usefulness.

We promise you this: Any one of 21 different SKIL models you choose will change a lot of your ideas about drills. Your SKIL dealer has the facts to convince you. Get in touch with him soon and ask for a free copy of the 58-page SKIL Industrial Power Tool Catalog. It contains detailed information on over 100 different SKIL Industrial Tools. Or simply mail coupon.

P.S: *34 completely equipped factory branches and 50 factory-authorized SKIL service stations are strategically located for quick, reliable service.*

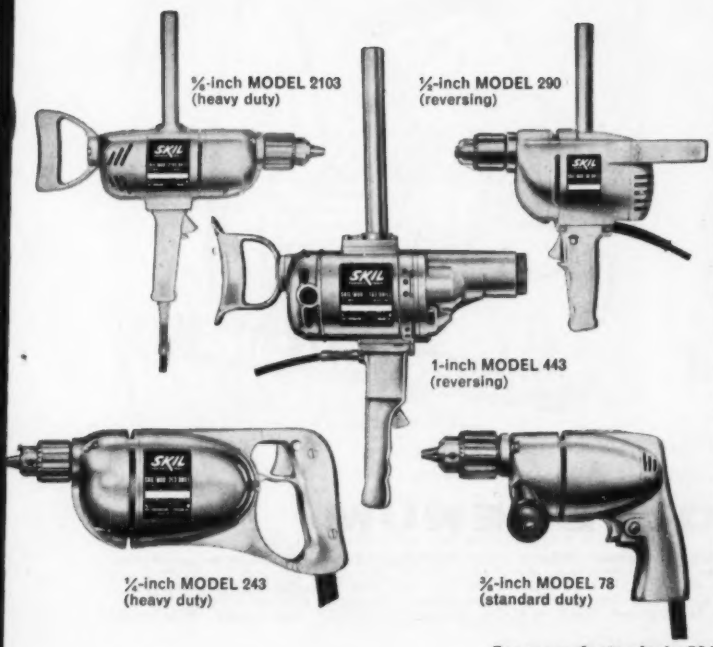
21 DIFFERENT MODELS—HANDLE THE TOUGHEST DRILLING JOBS GOING!



¼-inch MODEL 138 (standard duty)

SKIL

Famous SKIL and SKILSAW products, made only by SKIL Corporation, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street W., Toronto 9, Ontario.



FREE! 58-PAGE INDUSTRIAL POWER TOOL CATALOG

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☐ Please send me name of nearest SKIL Dealer

☐ Please send FREE 58-page Industrial Tool Catalog

*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

For more facts circle 586 on Reply Card

Stop these maintenance miseries (and others) in your plant...

Molysulfide™

is the cure!

Sure, problems like frozen nuts and galled spline drives won't put you out of business—but they'll put a crimp in your important maintenance schedules! The answer?

Molysulfide paste lubricants! These special lubricants—containing 25-70% Molysulfide—are tailor-made for the toughest maintenance-lubrication problems you've got. Here's why . . .

Molysulfide films out on metal surfaces. It forms a *rugged, heat- and cold-resistant, low-friction film* that prevents metal-to-metal contact even after man-sized hard knocks have pounded or squeezed base grease away. That's why Molysulfide *stays put* to lubricate as a long-term cure for such headaches as galling and seizing . . . stick-slip . . . chatter, fretting, and a whole host of other miseries. *But see for yourself!*

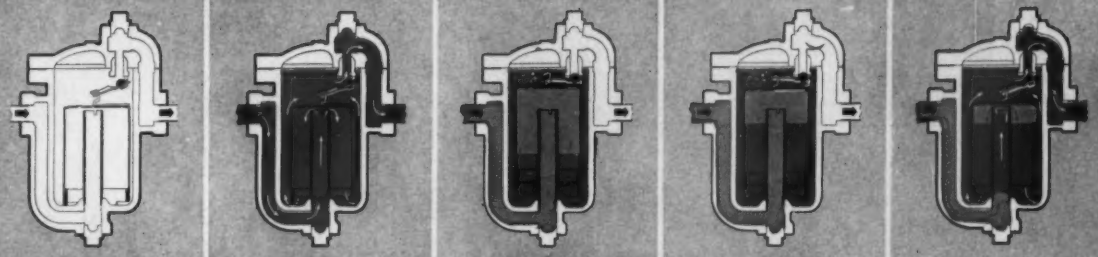
Try Molysulfide paste lubricants in your own shop. *Try just one pound*—order it from any of the manufacturers listed below. You'll agree—Molysulfide is worth its weight in aspirin! *Climax Molybdenum Co., a division of American Metal Climax, Inc., 500 Fifth Ave., New York 36, New York.*

CLIMAX MOLYBDENUM

Try a pound of Molysulfide paste lubricant for heavy-duty maintenance applications! Order it today from any of these well-known manufacturers: Acheson Colloids Co., Port Huron, Mich. • The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn. • American Lubricants Co., 1227 Deeds Ave., Dayton, Ohio • Base, Inc., 730 W. Jackson St., P. O. Box 461, Mil Milwaukee 1, Wisc. • Bel-Ray Co., Green Village Rd., Madison, N. J. • Bemol, Inc., 131 State St., Boston 9, Mass. • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toledo, Ohio • Hohman Plating & Mfg. Co., Inc., 905 East 3rd St., Dayton, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, Calif. • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pa. • Ore-Lube Co., 11 Front St., New York, N. Y.

For more facts circle 587 on Reply Card

This simple trap operating principle provides the efficiency, dependability and freedom from maintenance necessary for the most profitable use of steam



When trap is first installed, the inverted bucket is down and the valve is wide open.

When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until —

Steam (light color) reaching the trap floats the inverted bucket and closes the valve.

When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.

When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.

Key: condensate steam steam bubbles air bubbles

ARMSTRONG INVERTED BUCKET STEAM TRAPS

are designed and made to give you these big benefits:

Armstrong Traps, the first inverted bucket steam traps, now represent the most advanced development of this time-proven principle. They provide all the advantages necessary for efficient, economical condensate drainage from virtually all types of steam using equipment.

1. *No steam loss* – Steam never reaches the orifice even when there is no condensate load.
2. *Automatic air elimination* – Vent in trap bucket passes air and other non-condensibles through to be discharged with condensate.
3. *No cooling leg required* – Condensate is discharged at steam temperature as fast as it reaches the trap because trap operates on difference in density between steam and water not on temperature.
4. *Operates on any back pressure* — Failure of one trap in system will not cause others to open because high back pressure does not affect an Armstrong trap other than to reduce capacity. As long as there is a pressure differential across the orifice the trap will close on steam and open for condensate.
5. *Unaffected by ordinary dirt* — Swirling action of condensate keeps dirt in suspension until discharged with condensate, prevents it from lodging in valve.
6. *Completely dependable* — Proved design plus the use of all stainless steel working parts assure continuity of service and length of service unmatched by any other trap.
7. *Big capacity in a small, economical package* — Armstrong design gives you the highest practical capacity for any given pressure. And remember, Armstrong capacity ratings are based on *hot* condensate at the *working pressure differential* stated, not on theoretical orifice capacities.

Further information on these advantages plus much additional information is given in the 48 page Armstrong Steam Trap Book. Ask your local Armstrong Representative or write direct.

860 Series for low pressure heating service.

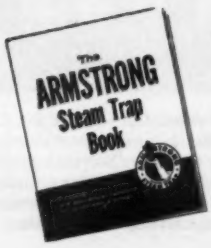
800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

200 Series, bottom inlet, top outlet.

Forged Steel Series for high pressures, high temperatures.



The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

9129 Maple Street Three Rivers, Michigan

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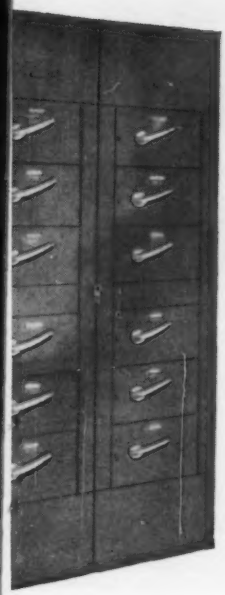
I-T-E Model ETI circuit breakers...
specially designed for motor control centers

GET THE EXTRA ADVANTAGES OF THESE OTHER

Most advanced 600 v power switchgear . . . with new I-T-E K-LINE circuit breakers. Pulldown handle and stored energy mechanism give 5-cycle closure every time. Means longer contact life, greater operator safety, less maintenance. Wide load range trip adjustment saves later modification. Closed door disconnect for safety.

Best coordinated secondary unit substations. Only I-T-E designs and builds complete secondary unit substations in one plant. Engineers work closely together. So you benefit from extra time and money-saving features: better coordinated designs, easier assembly, pretested performance, and delivery to match your own construction schedule.



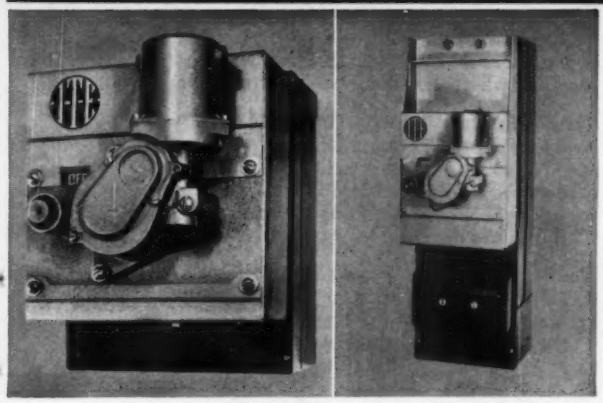
Motor circuits need this PINPOINT PROTECTION

I-T-E Model ETI circuit breakers are special purpose . . . with advantages that motor circuits need for complete protection. Unlike regular circuit breakers, they can be easily set to an instantaneous rating about 11 times normal full load current. This gives instant protection against overload damage without nuisance tripping. Regular breakers are preset at instantaneous ratings as high as 100 times full load current.

Look what this difference means. Take the example of a 20 amp breaker recommended for use with a motor starter for a 500 horsepower 440 volt a-c motor. Full load current is 7.5 amp. An ordinary breaker would have an instantaneous trip setting of 500 amp—many times the desired value. A high resistance fault or short circuit current less than 500 amp could do permanent damage before thermal devices would trip the breaker. But a 25 amp Model ETI breaker in this application would have an instantaneous trip setting of only 87 amp . . . giving instant opening in case of high current faults without nuisance tripping. Model ETI circuit breakers are available in five frame sizes and in ratings up to 800 amp continuous.

I-T-E CIRCUIT BREAKER COMPANY

I-T-E PRODUCTS TOO



TELEMAND* . . . Molded case economy . . . remote control luxury. Now I-T-E molded case circuit breakers are available with new motor operators for remote opening, closing or resetting. Can be easily wired for pushbutton control from a distance. Costs far less than alternative devices. Also permits local or automatic operation.

I-T-E Circuit Breaker Company I-4
1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Molded case circuit breakers for motor control centers
- ☐ K-LINE LV switchgear (600 v)
- ☐ Secondary unit substations
- ☐ TRANFO-UNITS†
- ☐ TELEMAND motor-operated molded case breakers
- ☐ Power switching centers
- ☐ URELITE® circuit breakers
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)

†Tranfo-Unit is a Reg. TM of I-T-E

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____

SEND COUPON OR WRITE

Get complete up-to-date information on I-T-E equipment

**An I-T-E trademark*

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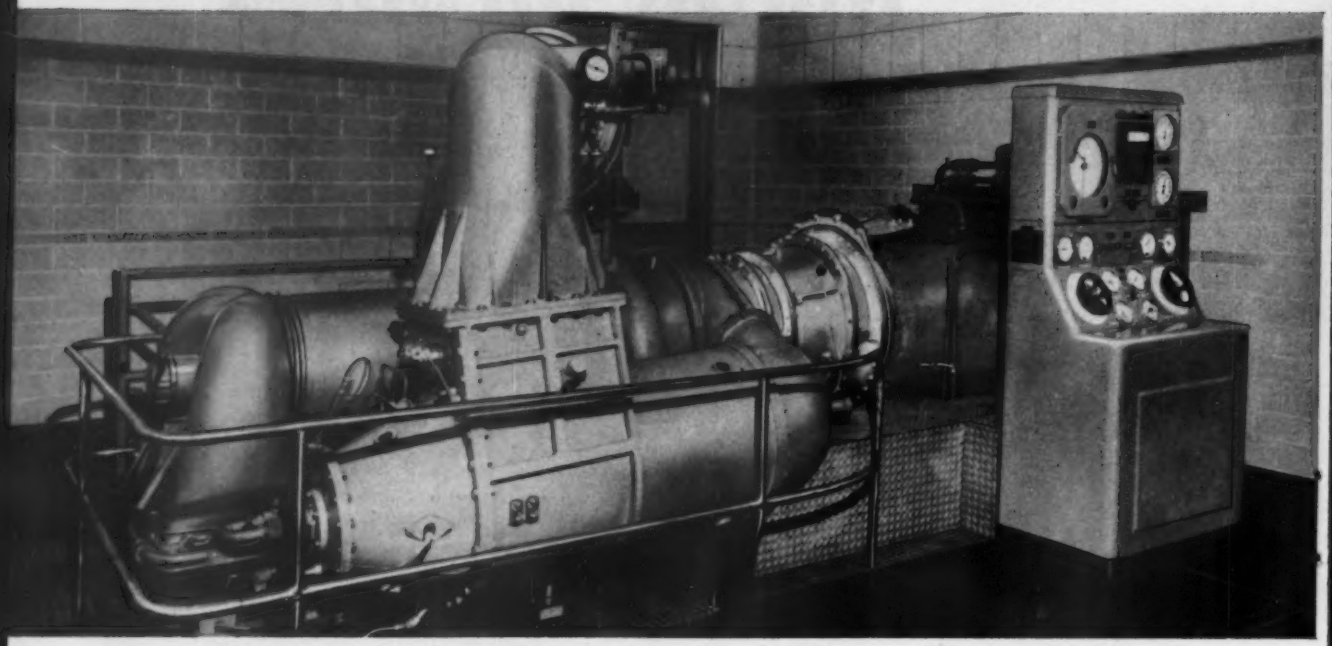
FIRST **IN PRODUCTS PIPELINING** — Up to 100,000 b/d are moved by a centrifugal pump powered by this Clark Mark TA Gas Turbine in a major products pipeline company. The Mark TA and pump do the same amount of work as two three-stage pumps in series driven by 800-hp diesels . . . and require less space, less maintenance.



CLARK MARK TA GAS TURBINES

FIRST FOR FIVE NEW POWER APPLICATIONS

A products pipeline, two widely differing mining operations, a catalytic cracker, a gas/gasoline plant join the trend to gas turbines for power in field and plant applications. And they choose the Clark Mark TA Gas Turbine because this lightweight packaged unit is demonstrating dual advantages and economies. Power generation is a prime function, but as an operating bonus, its hot exhaust gases can generate process steam, hot water and air.

There are sound reasons for the growing popularity of Clark Gas Turbines. An efficient, single combustion chamber—using gaseous or liquid fuel—provides the design simplicity and dependability required for long service life with minimum maintenance. Thermo-elastic design makes it possible to accept full load quickly without stress. Dual-shaft construction assures maximum speed flexibility for process use. Air cooling makes Clark Gas Turbines ideal for locations where short water supply is a problem.

The Clark Mark TA Gas Turbine is conservatively rated at 1220 bhp, with a normal output speed of 6000 rpm. Three other standard speed models are available. For applications requiring more horsepower, Clark 302 and 305 Gas Turbines are rated up to 9300 bhp.

Your nearest Clark representative has full information on all Clark Gas Turbine models. Or simply write for Bulletins 162 and 163-1 to Clark Bros. Co., 2430 Lincoln Ave., Olean, N. Y.

CLARK

CLARK BROS. CO.

OLEAN, N. Y.

One of the Dresser Industries

COMPRESSORS • ENGINES • GAS TURBINES

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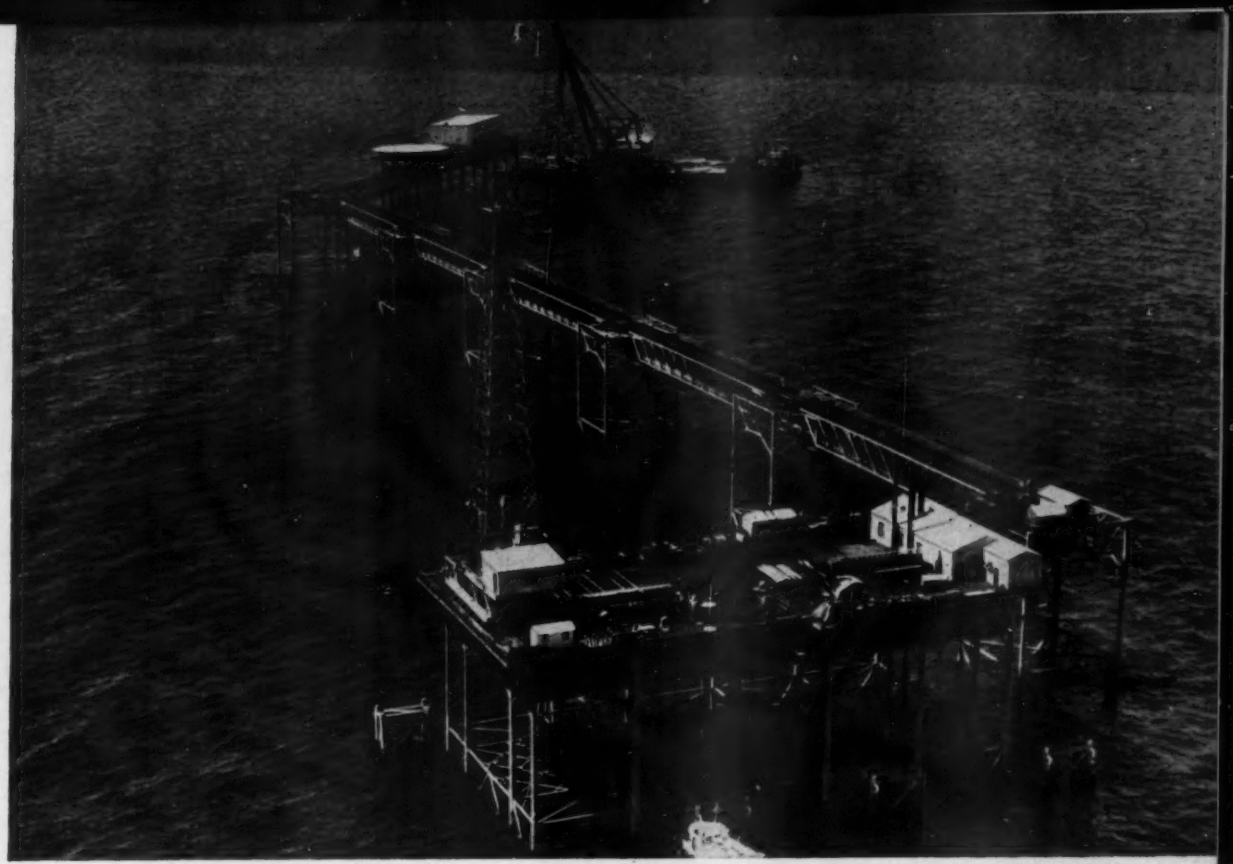
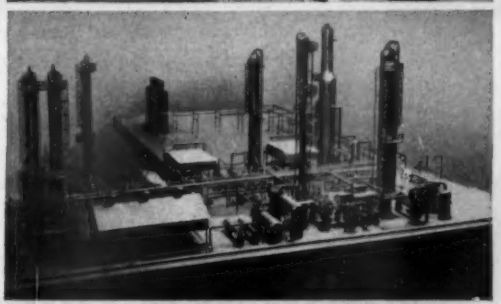


FIRST IN OFFSHORE SULPHUR MINING

Seven miles out in the Gulf of Mexico, Freeport Sulphur Company uses a Clark Mark TA as prime mover in the production of molten sulphur from a deposit 2000 feet below the surface of the Gulf. The Mark TA by driving an electric generator produced power for the drilling rig that put down the production wells (this is the first time a gas turbine has been used on an electric rig). After the main power plant is on stream, the Mark TA will continue in service: (1) Producing part of the plant electrical power used for many vital functions including powering the Clark Balanced/Opposed Compressors supplying the air which lifts the molten sulphur to the surface, (2) Supplying the boilers with hot combustion air which, the supplementary fuel, will generate the steam necessary to heat 5 million gallons of water per day used to melt the sulphur deposit.

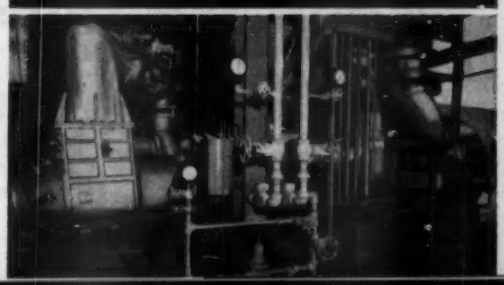
FIRST IN OPEN PIT MINING

This Clark Mark TA driving a generator not only supplies electricity for operation of the Greybull, Wyoming, installation of the Magnet Cove Barium Corporation, but in addition its exhaust gases are used for drying ore. Even discounting the ore-drying bonus, the mine manager reports "better than anticipated fuel economy."



FIRST IN GAS/GASOLINE PLANT

All electric power requirements plus generation of process steam in a waste heat boiler will be accomplished by a Clark Mark TA in the gas processing plant now being constructed for Sun Oil Company near Laverne, Oklahoma (model shown). Initial plant capacity is rated at 100 M.M.s.c.f.d. A projected 50 percent expansion can be accomplished with the same power unit.



FIRST ON A SMALL CAT CRACKER

This Clark Mark TA, mounted outdoors, drives a cat cracker blower supplying air directly to a catalyst regenerator at the Duncan, Oklahoma, refinery of DX Sunray Oil Company. Though larger gas turbines have been used in this manner before, the Mark TA is demonstrating the efficiency of smaller applications. The Mark TA Gas Turbine is available through a licensing agreement between Ruston-Hornsby Ltd., Lincoln, England, and Clark Bros. Co.

It's BRUNNER SINCE 1906 COMPRESSED AIR FOR 8 BIG JOBS AT

CONVER STEEL AND WIRE COMPANY
NEW YORK CITY, NEW YORK

A Brunner 50 H.P. industrial air compressor provides a dependable source of compressed air at the Conver Company.

Vital to the Conver manufacturing are these 8 jobs that Brunner air equipment operate:

1. Spot and projection welders.
2. Straight and radial benders for forming rounds, flats and tubing.
3. Material ejection from dies after forming.
4. Acting as an air cushion and pressure pad for deep drawing work.
5. Operating paint mixers (eliminating fire hazards).
6. Operating air jets in cleaning operations.
7. Performing secondary press and wire forming operations.
8. Clamping, holding, riveting and stapling.

Quite likely you have comparable "compressed air operated" jobs. Whether your compressed air demands are few or many . . . big or small, you can depend on proven Brunner Compressors, available in a range of sizes from ¼ H.P. through 50 H.P.

Ask for a Brunner engineer to analyze your compressed air requirements. He can be mighty helpful in making your operations more efficient.

Brunner Industrial Air Compressor Catalog #37 is available on request.

BRUNNER DIVISION
DUNHAM-BUSH, INC.
WEST HARTFORD 10 • CONNECTICUT • U. S. A.

DUNHAM-BUSH
AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER
WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA
MARSHALLTOWN, IOWA • RIVERSIDE, CALIFORNIA
SUBSIDIARIES

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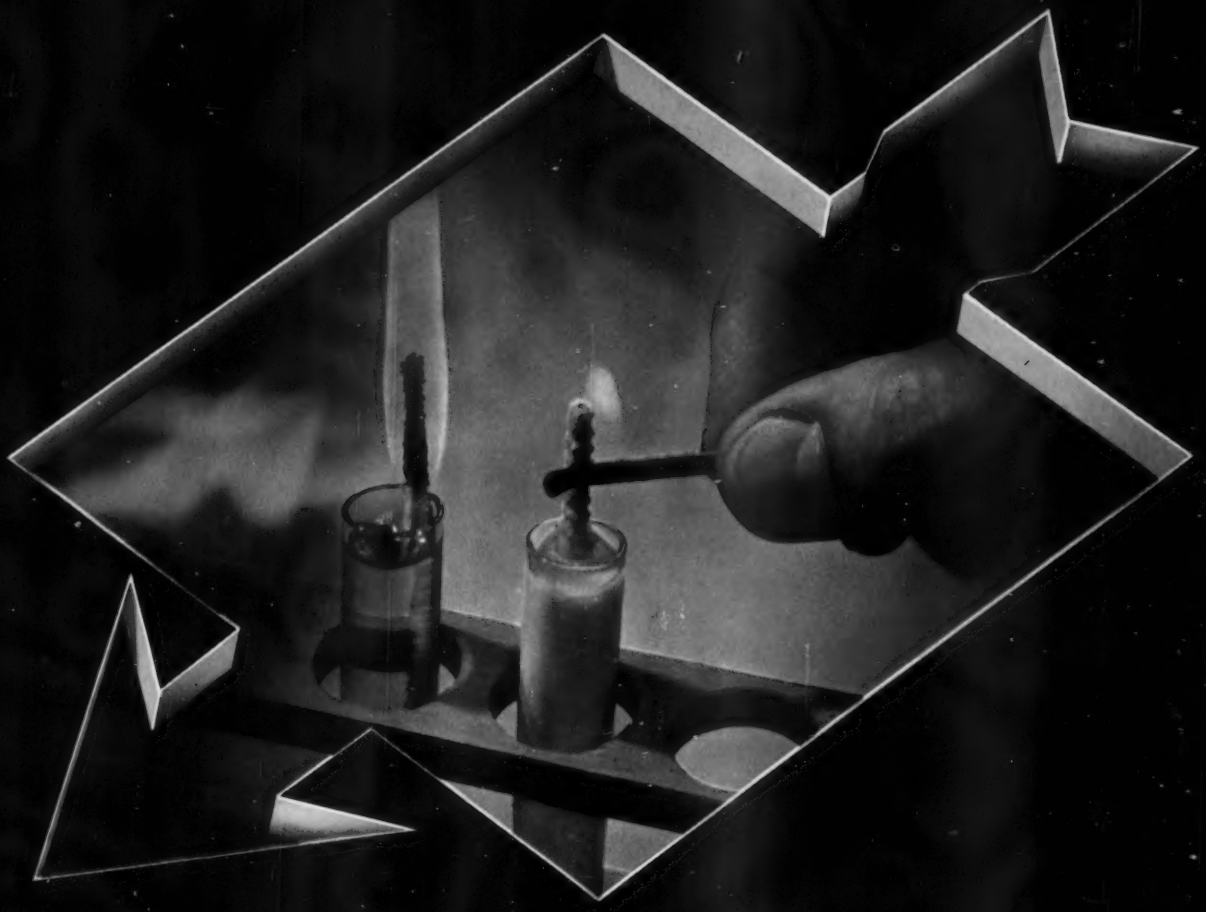
For more facts circle 592 on Reply Card →

Quality... the best economy of all



Another product of Sunoco research . . . a fire-resistant hydraulic fluid

The flame test, above, dramatizes the effectiveness of Sun's new fire-resistant hydraulic fluid. The wick in the conventional fluid burns readily; the wick in Sun's new fluid just can't be lighted.

SUNSAFE, a water-in-oil emulsion, eliminates fire hazards . . . provides increased safety to personnel and equipment. At the same time, operators get the essential performance characteristics of a top-grade hydraulic oil—low rates of wear, long service life, and protection against rust and corrosion.

This combination of *quality* in engineering know-how, and *quality* in product, proves once again that *quality* in any sense is the best economy of all.

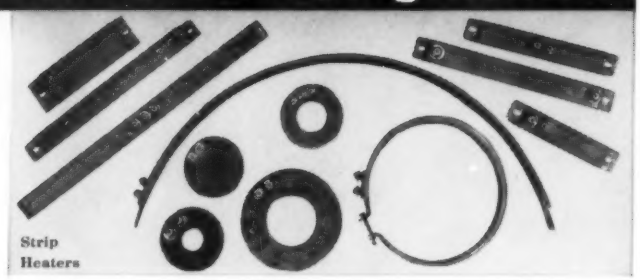
For 73 years Sunoco has meant quality right down the line. Today, this quality is found in more than 400 Sunoco industrial products. SUN OIL COMPANY, Phila. 3, Pa., Dept. I-14.
In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

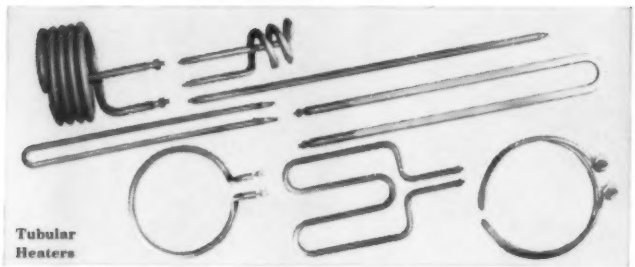
SUNOCO

PRINTED IN U.S.A.

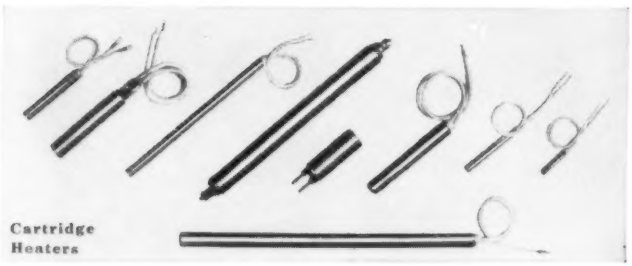
Call your CHROMALOX Man for the heating answers



Strip Heaters



Tubular Heaters



Cartridge Heaters

These 3 basic CHROMALOX heaters provide answers to just about any heating problem

Strip Heaters . . . that quickly and easily bolt or clamp to platens, dies, kettles, tanks, pipes, rolls, drums, ovens and air ducts. Lengths from 4 to 96 inches, widths from ¾ to 2½ inches, with cross section curving or lengthwise bending. Available with brazed-on fins.

Tubular Heaters . . . that clamp on, fit into machined grooves, cast into metals, immerse in liquids, install in ovens and ducts. Straight lengths or factory-formed to nearly any contour. Lengths from 6 inches to 30 feet. Triangular or round cross section. Available with brazed-on fins.

Cartridge Heaters . . . that smoothly fit standard drilled holes in dies, platens, molds, extrusion and injection barrels. Special leads available for protection against flexing action, abrasion, moisture or vapors. Diameters from ⅜ to 1 19/64 inches, lengths from 1⅝ to 25⅜ inches.

Versatile Chromalox electric heaters are available in sheath materials and wattages to match almost any application to 1100°F. Easy to install, they are fast, clean, safe and economical.

Your Chromalox Man can help you determine the one that best answers your specific problem. He's backed by the world's largest factory stock of industrial heaters, ready for immediate shipment. Why not give him a call. You'll find his phone number listed at the right.

Our new Catalog 60 provides detailed product information and suggests numerous applications for the complete line of Chromalox electric heaters for industry. If you have not yet received a copy, please let us know. 1901

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CHROMALOX
Electric Heat
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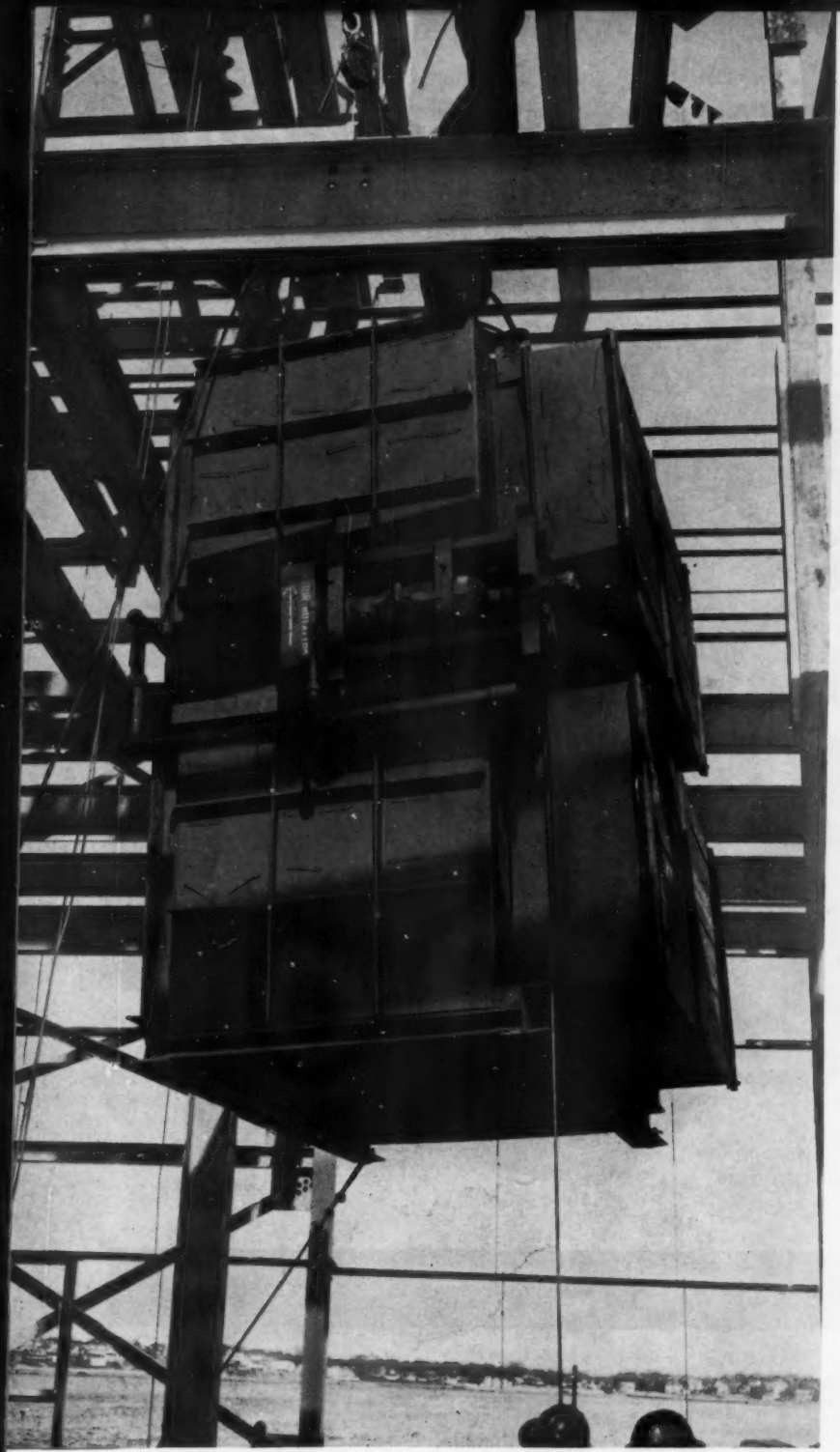


Complete and ready to run, Package Air Preheater is lowered through steelwork of new power station at Braintree, Mass. Installation at Braintree Electric Light Dept. uses largest available package preheater, with a diameter of approximately 12'. Fitted to a 130,000 lb per hr boiler, this Package Air Preheater will boost combustion air temperature by about 420°F with heat recovered from stack gas.

PACKAGE AIR PREHEATER

gives twofold economy at Braintree's new power station

PACKAGE DESIGN FACILITATES INSTALLATION; FUEL SAVINGS TO WRITE OFF COST IN 2 YEARS.

Braintree, Mass., has achieved an economic double-header with the Air Preheater in their new power station:

1. Initial saving: The Package Air Preheater, shown above, was delivered as a completely preassembled unit. All it needs is gas ducts and a power line and it's ready to work—installed at a fraction of the time and cost required for conventional units.

2. Long-term savings: Records prove that Braintree's Package Air Preheater can pay for itself—just on fuel savings alone—within two years.

Package design gives you these advantages on boilers as small as 25,000 pounds of steam per hour—or as large as 250,000 lbs per hr. And a Package Air Preheater is one of the surest ways to reduce fuel consumption: you cut your fuel bill 1% with every 45-50°F increase in preheated air temperature.

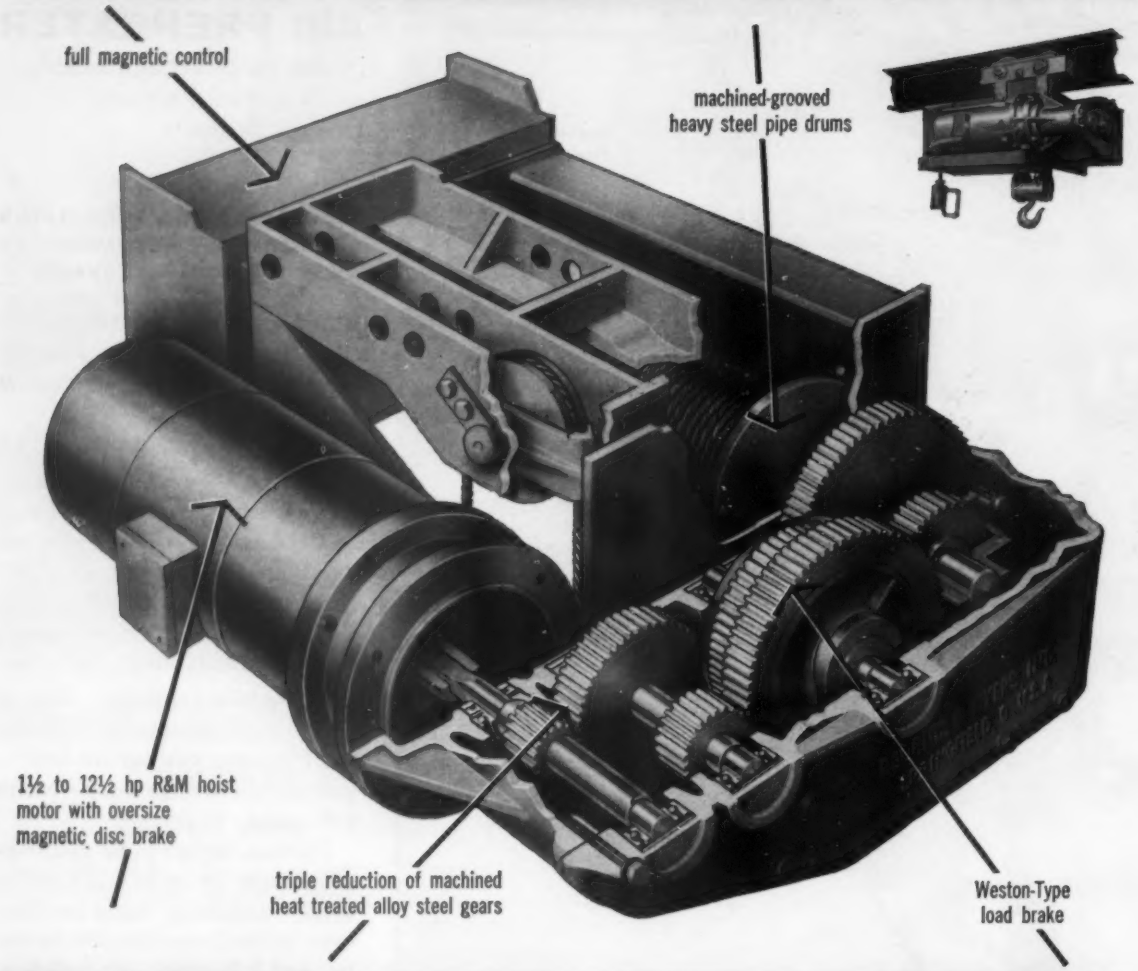
Get all the facts. Write today for your copy of the free 14-page booklet describing the multiple savings you get with a Package Air Preheater.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

For more facts circle 594 on Reply Card

big hoist value


full magnetic control
machined-grooved heavy steel pipe drums
1½ to 12½ hp R&M hoist motor with oversize magnetic disc brake
triple reduction of machined heat treated alloy steel gears
Weston-Type load brake

R&M Type F standard low-headroom hoists excel in the heaviest, most severe service. Frame is solidly braced welded steel. Special weather and dustproof R&M hoist motor runs cool, has the highest time rating found in any standard hoist—30 min., 55° C. rise. And the oversize magnetic disc type motor brake requires virtually no adjustment. Full magnetic control with reduced push-button voltage is standard. With lug mounting, Type F-2 headroom is only 16½" in 2 ton capacity.

Capacities: ½ to 10 tons. Speeds: 10 to 54 fpm. Lug mounting; push, hand geared or motorized trolleys.

Robbins & Myers, Inc., Hoist & Crane Div., Springfield, O.

take it up with

ROBBINS & MYERS

holsts cranes

Request Bulletin 801-C today

For more facts circle 595 on Reply Card

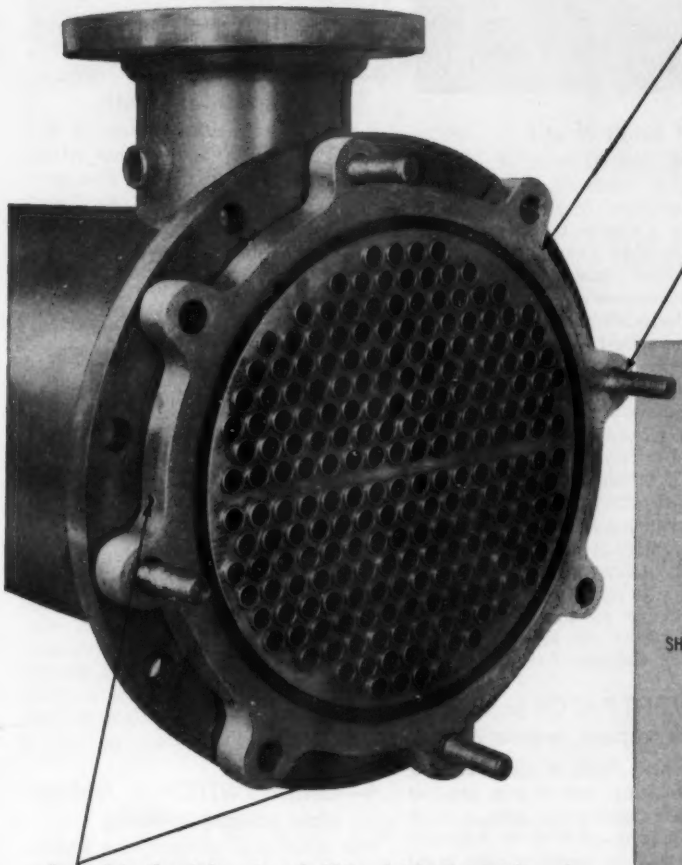
Simply remove the bonnet to make a shell side pressure test

Paracoil

EXCHANGER TYPE **PC**

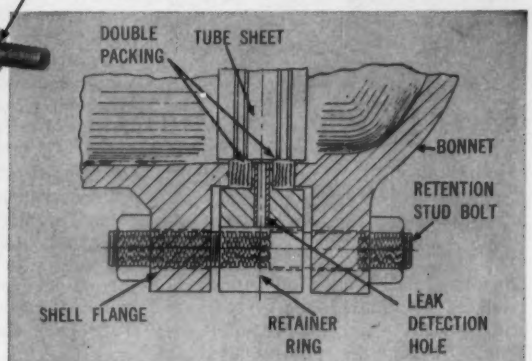
FOR ☐ COOLING ☐ HEATING

☐ OIL ☐ WATER ☐ AIR ☐ GAS



Unique retainer ring permits fast, easy inspection and servicing of packing. All that is necessary to set up a shell side pressure test is to remove the end bonnet by backing off on its single set of holding nuts. The retainer ring continues to hold the shell side packing in compression (see details below). No clamps or special devices needed. Piping connections are left undisturbed.

Retention stud bolts pass through the shell flange and screw into threaded retainer ring lugs, holding the ring and packing in place with bonnet off.



HOW IT WORKS

Section at packing retainer ring weephole. Seepage from either shell or tube sides drips out through copper-lined weephole. If tightening the gasket compression nuts fails to stop the leak, simply remove the end bonnet and pressure-test the shell side to locate the trouble—either the tube-end rolling or the shell-side packing. If neither, then the tube-side packing is at fault.

PARACOIL TYPE PC EXCHANGER

Leak detection holes at each 90° point in the retainer ring reveal any leakage past either the shell or tube side packing. **The absence of leakage indicates that the packing is holding—hence no dismantling is necessary for packing inspection.**

PARACOIL PC Exchanger tubes are straight for easy cleaning. The tube bundle is fully removable.

THESE DESIGN FEATURES SAVE HOURS OF MAINTENANCE TIME EVERY INSPECTION.

For details, write for Bulletin 140-A

DAVIS ENGINEERING

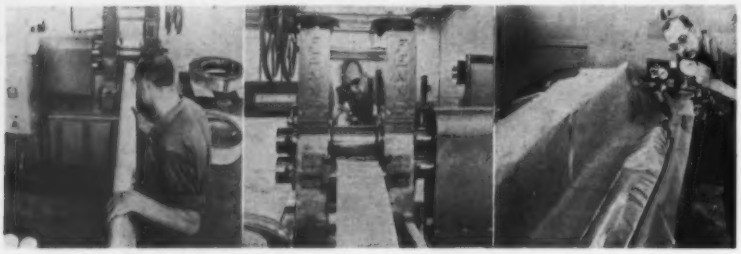
(A Division of American Metal Products Company)

520 Main Avenue, Wallington, N. J.

For more facts circle 596 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

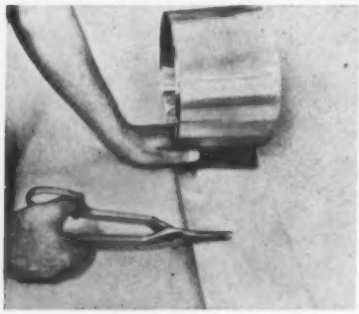
Edited by M. E. Heniken



More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 279-280.

1—METAL TUBING ships flat, inflates at point of use

Strubing (strip tubing)—to be produced experimentally this fall—is a light wall seamless metal tubing that can be shipped in ribbon form and inflated at point of use. It affords



handling and storage advantages as well as shipping economy—only the tube "walls" are shipped, not the "hole." Also, the process used in making Strubing, technically classed as "cold rolling," provides an economical means of producing thin wall tubing of material and thicknesses

either unavailable today, or available only at prohibitive cost.

Among anticipated applications of Strubing are ductwork for heating systems, electrical conduit, sheathing for power and communications cable. Lining-by-inflation techniques offer possibilities of producing low-cost corrosion-resistant piping and vessels by combining Strubing made of a corrosion-resistant material and ordinary steel. (Tantalum Strubing might be inserted in a pipe or tank and inflated to form an inner liner.) It is believed this technique could also be used for repairing sewers and water mains that develop leaks. Strubing could be inserted and inflated to act as a protective inner tube.

In manufacturing of Strubing, a simple hollow tube is made by conventional techniques. This is passed through a rolling mill where it is flattened. The rolling process elongates the original tube by making it thinner without changing the inside tube diameter. The more it passes through the rolls, the thinner it gets. Inflation methods vary with application, etc. Hydraulic and air pressure and mechanical means are used. Wolverine Tube Div., Calumet & Hecla, Inc.

2—CEMENT PATCH bonds concrete, repairs masonry

Latex Cement Patch is described as a fast, self-curing easy-to-mix product for repairing everything from a crack to a big hole in concrete or masonry. It is claimed to assure a tight bond and non-brittle toppings, and to minimize shrinkage. A general purpose compound requiring no primer, it is applied with trowel or spatula for area patching of concrete floors, walls and structural parts—even surface refinishing from 1/16 in. up in thickness. It also serves as an easily worked mortar.

The product consists of latex (liquid binder) and powder (dry, premixed cement and fine aggregates) supplied in complete packages. A gallon of the latex and 40 lb of powder cover about 40 sq ft, ⅛ in. thick. At 70 to 80 F, Latex Cement Patch in thicknesses of ¼ in. or less will set within 2 hr, according to manufacturer. The Flintkote Co.

3—WIRING SYSTEM utilizes panel space efficiently

This structural wiring system is designed to utilize depth behind relays in building control panels. This permits compact mounting of relays and use of smaller panel enclosures. Units

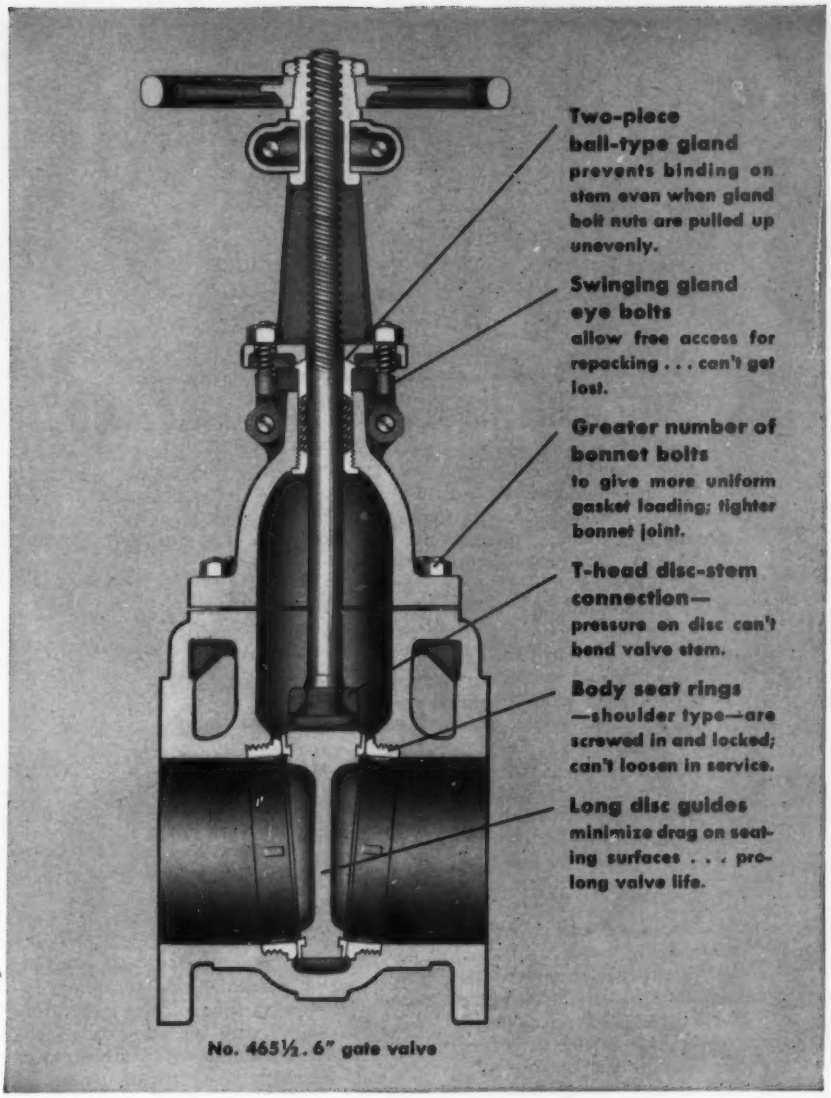
are hinged aluminum modular construction with built-in wiring compartments. Relays are mounted on the top surface and control wires contained under the devices. Each module swings out so control wires can be snapped into place behind flexible vinyl retaining fingers. Units provide for containing both horizontal and vertical wiring. Wyr-Way, Inc.

4—LIMIT SWITCH is replaceable without rewiring

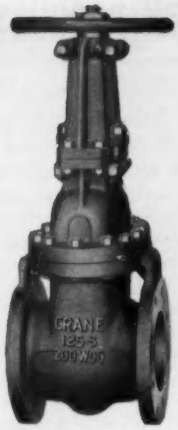
This heavy-duty oil-tight limit switch, which can be replaced without disturbing wiring, features a "power plug" connecting the power cable to the switch with a threaded coupling. To replace switch mechanism, you remove the four mounting screws, disconnect power cable, lift off the switch, mount the new one and reconnect power cable. Bulletin 9007-3 gives details. Square D Co.

5—ZINC COATING features rapid drying time

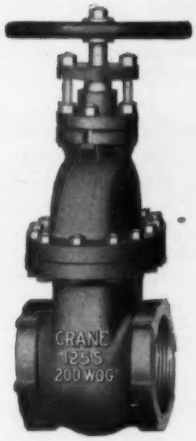
Carbo Zinc 11 is announced as an all-inorganic zinc coating designed to provide a high degree of galvanic protection and to eliminate sub-film rusting in salt water, fresh water and solvent environment, at temperatures


Two-piece ball-type gland
prevents binding on stem even when gland bolt nuts are pulled up unevenly.
Swinging gland eye bolts
allow free access for repacking . . . can't get lost.
Greater number of bonnet bolts
to give more uniform gasket loading; tighter bonnet joint.
T-head disc-stem connection—
pressure on disc can't bend valve stem.
Body seat rings
—shoulder type—are screwed in and locked; can't loosen in service.
Long disc guides
minimize drag on seating surfaces . . . prolong valve life.

No. 465½. 6" gate valve



No. 465½. 125-Pound, OS&Y, bronze trimmed. Flanged ends. 2" to 48". Also in all-iron.



No. 460. 125-Pound, non-rising stem. Bronze trimmed; screwed ends. 2" to 8". Also in all-iron (to 4" only).

The valves most plants rely on—
CRANE 125-POUND IRON BODY GATES

On general utility services . . . water mains and distribution lines . . . low-pressure steam and hot water . . . air and gas . . . more plants rely on Crane No. 465½ iron body bronze trimmed gates than on any other valve in this class. The cross section above reveals some of the advantages of Crane improved iron valve design . . . how they assure dependable operation through long life and provide for convenient servicing.

To enable you to standardize on these economical, efficient valves, Crane builds No. 465½ gates in sizes from 2 to 48 in. Popular sizes are available from local stocks of your Crane branch or Crane wholesaler.

See your Crane catalog for the widest selection of iron body valves: gates, globes, angles and checks. Your local Crane Representative will be glad to help choose the right valves for your service.

CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Illinois—Branches and Wholesalers Serving All Areas

For more facts circle 597 on Reply Card

NEW PRODUCTS

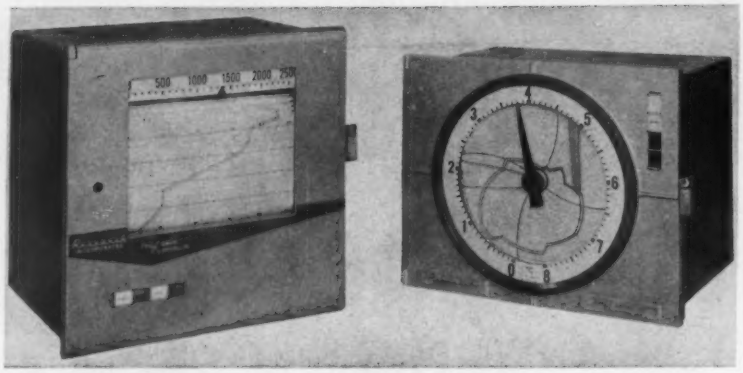
(Begins on page 196)

of −80 to 750 F. It can be used as a single coat protection or as a prime coat for other organic and inorganic topcoats. Although applied by brush, spray or roller, Carbo Zinc 11 is similar to hot dip galvanizing, company notes, and has many of the same properties. The coating provides a conductive zinc film which slowly goes into solution as needed when immersed to give galvanic protection to steel surfaces. Should coated steel become damaged, the unprotected steel will not rust, company says. It becomes water insoluble after 20 min. Rain, condensation, spray or rising tide are claimed not to damage or dissolve coating. Manufacturer says painting can be done in 90-100 per cent relative humidities, at temperatures ranging as low as −20 F. The Carboline Co.

6—TRANSFORMER is "do it-yourself" unit

The Flexiformer, a packaged transformer primary, makes stocking of many fixed-ratio transformers unnecessary. Essentially, a Flexiformer is a self-contained toroidal primary coil consisting of a strip-wound silicon steel core having a coil of 400 turns of No. 24 B&S gage copper wire. For use as a source of a-c voltage, you

simply hand-thread the proper number of secondary winding turns through the center opening to obtain the desired output voltage. Input rating is 120 v, 50/60 cycles, single phase and output is 150 va. When used as a current transformer, the Flexiformer winding becomes the secondary winding with the current induced by a wire passing through the center opening. Used with a 0-1 amp ammeter, currents to 400 amp can be measured. Flexiformers can be used for testing current carrying capacity of contacts, connectors, relays, circuit breakers, fuses etc. Bulletin TP659 gives more information. The Superior Electric Co.

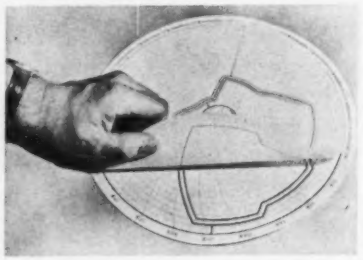


7—GRAPH-GUIDED PROGRAMMER records process performance

PreKorder is announced as a programming-controlling-indicating instrument which simultaneously "reads" a pencil-drawn program chart, controls a process accordingly, then superimposes a record of process performance on the same chart. Only visible hint that PreKorder differs from conventional chart recorders is absence of cams, cam followers and function generators. (Significant cost savings are attributed to their elimination.) The program appears as double-line graph, pencilled on the recording chart. The controller, sensing any deviation of the recording pen from the middle of the pencilled graph, regulates process to oppose deviation.

Two parallel lines defining the process program are connected electrically to the two ends of center-tapped transformer winding which serves as a voltage source for an electrostatic field between lines. The recording pen, serving also as a capacitive probe, picks up an error signal proportional to any deviation of the pen from its null balance to position. This error signal is used to effect a readjustment of the process in the proper direction to recenter the pen. Company points out that this technique of direct error signal derivation joins the programmer, recorder and process itself into a closed-loop control system.

With PreKorder, process programming is accomplished by merely drawing a double-line graph of desired program on ordinary chart paper. The program may be changed by erasing and redrawing this graph. A record of process performance is superimposed on the process program chart for visual comparison of actual and desired operation. Since the pen-probe senses its position between program chart lines without touching them, the chart may be overlayed by clear vellum paper on which the ink record is made. Thus, the master chart may be used repeatedly, with only the overlay changed after each recording. Use of an overlay also permits introducing variable programmed process limits by pencilling boundary lines on the overlay. Push-



button switches may be used singly or in combination to provide indication only, indication and recording with or without chart advance, set point control and indication, program control and indication, and program control, indication and recording.

PreKorder is adaptable to any process which may be electrically controlled and monitored by a transducer mechanically or electrically connected to the recording pen. Examples are in programming and control of temperature, pressure, voltage, power, liquid level, humidity, flow pH, position, speed, force. PreKorder come in both circular and strip-chart types with a broad range of scales, chart speeds, pen speeds. Research, Inc.

8—ALUMINUM PAINT minimizes overspray problems

Dri-Spray Aluminum is intended to eliminate need for drop cloths or other protection on surfaces near a painting area. Overspray dries almost instantly in the air, says company, and any dried particles on adjacent surfaces can be wiped up or brushed off like dust. Dri-Spray is expected to be a boon in outdoor work where damage to nearby structures or automobiles is a possibility. Another advantage is that desired film thickness

Reduce Costly Wear on Air Equipment

Pipe scale, pipe dope, condensate, emulsified and deteriorated compressor oil — all damaging to connected air equipment — are inherently present in all compressed air systems. Provide for the efficient removal of these contaminants and assure top performance from air actuated devices by specifying a Norgren Air Line Filter in your design.

- 99 Models to choose from — ⅛", ¼", ⅜", ½", ¾", 1", 1¼", 1½" pipe sizes.
- Choice of 4 Filter Elements — 74, 64 or 25 micron... 5 micron available in some sizes.
- Transparent or Metal Bowls
- Wide Operating Pressure Range — Top efficiency at pressures as low as 5 psi—as high as 250 psi for metal bowl type.
- Wide Operating Temperature Range—Metal bowl models extend temperature range to 200° F.
- Automatic or Manual Drain — Automatic drain eliminates maintenance cost for draining manually.
- Abrasive Solids and Corrosive Liquids — are removed from air lines, reducing equipment wear, repair and replacement costs.

NEW Clamp Ring FOR FASTER, EASIER MAINTENANCE

...most Norgren Filters now have a new, improved clamp ring, featuring a quick-opening spring clip that securely locks it in place — no tools required for servicing filters.

For complete information,
call your nearby Norgren Representative listed in your telephone directory — or WRITE FOR DESCRIPTIVE LITERATURE.

If it's Norgren... It's Dependable.

C. A. NORGREN CO.

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TORQUE-ARM

America's most widely used shaft mounted speed reducers!

DODGE PARA-FLEX

The Flexible Cushion Coupling

with the 4-way flex!

AIR-GRIP CLUTCHES

Amazing sensitivity — instant response!

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- ✓ Air-Grip Clutches—technical data.

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DODGE
of Mishawaka, Ind.

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 196)

may be obtained by making extra passes with the spray gun. The paint is pigmented by aluminum supplied by Aluminum Co. of America. It may be used for both indoor and outdoor metal, masonry, wood and plaster, but should always be applied with a spray. On smooth surfaces, a gallon covers about 2000 sq ft. Tropical Paint Co.

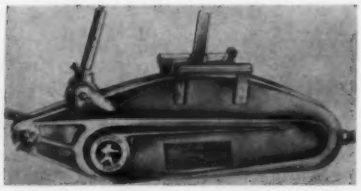
9—SKYLIGHT is low in cost, provides ventilation, too

Reported to cost no more than a conventional ventilator, the Consolite Power Ventilating Skylight is a low-silhouette fiber glass unit with built-in squirrel cage blower. The skylight

is light in weight, comes in self-flashing and curb-mounted models and is designed for fast, one-piece installation. Five colors are offered and an accessory plastic grid is available with extruded aluminum frame for finishing off the ceiling opening. The unit is designed for a 20-by-20 in. roof opening. It operates on 60-cycle, a-c, 115 v, has an exhausting capacity of 108 cfm, speed of 1525 rpm. The motor is removable without displacing the skylight. Consolite Skylights, Div., Consolidated General Products, Inc.

10—STEAM HOSE with built-in protection

Steam cleaning and flash-fire protection in refineries, and blowing out in foundries and steel mills are claimed safer with No. 200 BW Steam Hose. Designed for use to 200 lb saturated steam pressure at 388 F, its steel wire braid construction gives strength and flexibility. The hose is claimed virtually burst-proof because wire braid prevents open burst when worn out. Two braids of high tensile, multiple end, non-corrosive steel wire are stretched over an asbestos covered innertube of thick, heat resisting rubber. A butyl cover contributes to maximum heat and weather resistance. The hose comes in sizes from ½ to 2 in. Manhattan Rubber Div., Raybestos-Manhattan, Inc.



11—HOIST does the heavy lifting or pulling

Model T-35 Griphoist, a heavy-duty companion of manufacturer's standard unit, is rated at 3 tons, but handles 12 tons or more when used with pulley blocks, it is stated. This hoist follows the same principle of the standard Griphoist—two sets of alternately gripping, self-energizing jaws—and offers the same advantages of light weight (60 lb), unlimited cable travel, minimum set-up time, operation in any position. Its special features include ball bearing crank, two speed mechanism which permits cable travel from 3 fpm on heavy loads to 9 fpm on lighter ones, and self-locking shackle type pin for quick anchoring. It uses ⅝-in wire rope. Griphoist, Inc.

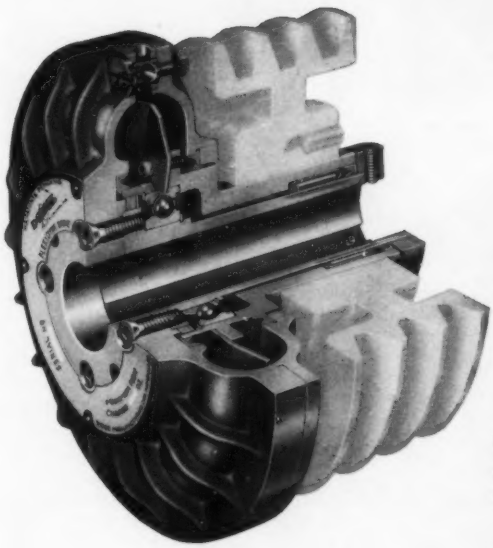
12—COOLING TOWER features plastic drip trays

Claimed to offer more cooling capacity in less space than conventional towers, Model AST Econ-O-Mizer is an outdoor type in which floor area, overall space requirements and weight have been greatly reduced. Also, according to company, this tower can

be readily disassembled and reassembled on the site, and the deck can be removed for cleaning within minutes. Secret of the tower is its plastic deck consisting of a series of high-impact polystyrene drip trays fastened into easy-to-handle "building blocks," which are simply stacked within the housing. Each tray has more than 600 individual, controlled drip spouts. The trays are staggered so that water passes slowly downward from one to the next in a precise pattern. Close con-

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

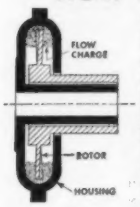
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE

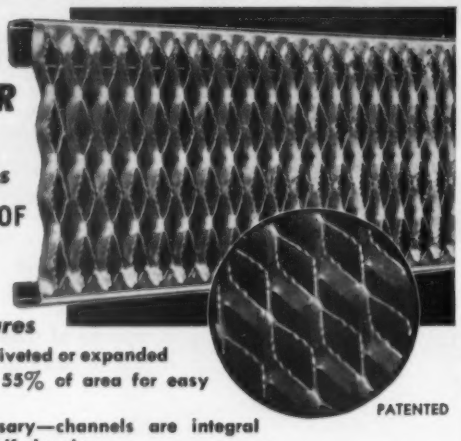
of Mishawaka, Ind.

For more facts circle 600 on Reply Card

two superior open steel
FLOOR GRATINGS
BY GLOBE

1 Safety GRIP-STRUT®

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT



Important Safety Features

★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
★ MINIMUM WEIGHT

Important Economy Features

★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

PATENTED

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 GOLD NUGGET® WELDED grating PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications

★ 3/4" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

10,000 POUNDS

For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The GLOBE Company MANUFACTURERS SINCE 1914
4016 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS
For more facts circle 601 on Reply Card

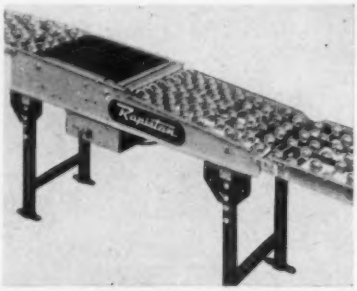
NEW PRODUCTS

(Begins on page 196)

trol of the drip pattern and air flow provide maximum contact between air and water with resultant high capacity and small size, it is noted; and since the plastic does not warp, the drip pattern remains constant for the life of the tower and capacity does not vary. Acme Industries, Inc.

13—CONTROL DEVICE counts cases as they come

Designed to count cartons, cases and boxes as they pass along a conveyor system, the Flow Control Register is described as a combination of mechanics and electrical circuitry which counts accurately without need for



spacing individual objects on the line. Counting is accomplished as each item passes over a roller. This partially depresses trigger fingers which open a circuit to generate an electrical impulse for each passing item. As the rear edge of the item drops down over the roller, a holding coil charges the electric counter. After the item passes over the fingers, the trigger returns to its normal position and the circuit is re-set for the next count. According to manufacturer, the method eliminates double counting and may be accomplished with the items back-to-back, as long as acceleration from the trigger finger permits re-setting of each charge. Rapids-Standard Co., Inc.

14—FLEXIBLE PIPE has tight sealing feature

Featuring an improved method of mating and sealing pipe faces, Type G series Gen-Lock Pipe requires no gaskets. The design allows a direct metal-to-metal bolting to pipe, with the rubber flange of pipe acting as its own gasket as it is compressed to form tight seal. The split retaining rings, of cast semi-steel, are designed for fast, snug mating of ring halves. Pipe comes in standard diameters from 1 to 12 in. ID, in any standard

Top Quality substations...

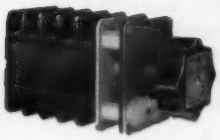
15 kv outdoor primary unit substation styled by Raymond Loewy

every major component manufactured by Federal Pacific

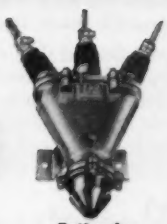
Power Transformers

Protective Relays

Indicating Instruments



Instrument Switches



Potheads

High Voltage Air Breakers

For single-source responsibility and reliable operation, look to Federal Pacific, one of only three companies to manufacture every major component of its primary unit substations. Federal Pacific's unit engineering, coordinated assembly, integrated quality control assure you built-in reliability and longer substation life. Federal Pacific Electric Company, General Offices: Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

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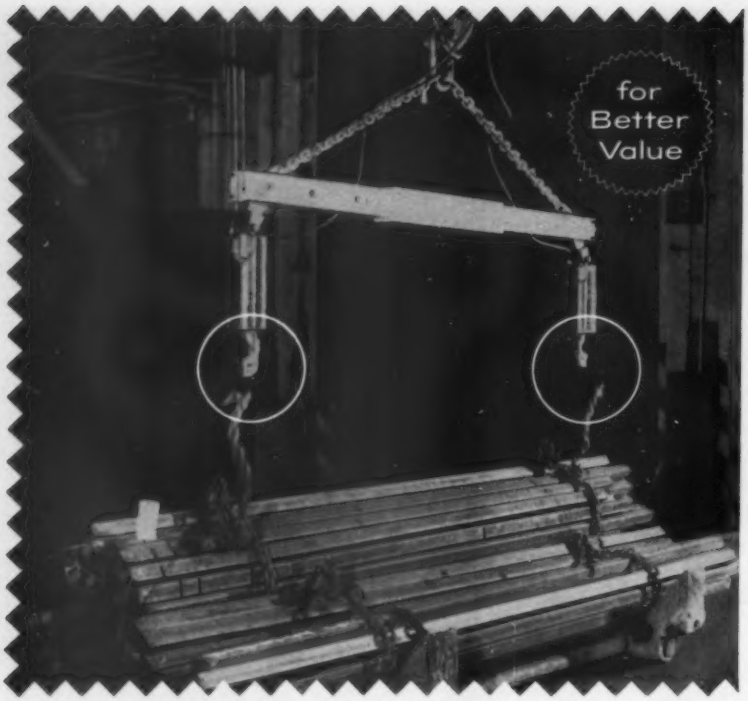


Where's the Man in this picture?

HE'S AT SAFE DISTANCE RELEASING THIS LOAD BY PUSH BUTTON CONTROL!

• Think of it! Now you can release "tough-to-handle" loads safely and without help from a follow-up man with the new Acco Solenoid Chain Release. Truly a revolutionary development in material handling, the Acco Solenoid Chain Release is controlled by the crane operator from his cab. Simply by pushing a button, he activates solenoids on the end of a spreader bar which in turn expels the chain from the hooks and releases the load. What if the control button is pressed accidentally or the power fails while the load is in the air? Nothing will happen because load must be on the floor with tension removed from the chain before solenoids operate.

The Acco Solenoid Chain Release is the safe answer to many material handling jobs where conditions make it dangerous for a man to unhook the load. Placing bundles of steel billets in a cooling pit is but one job made far safer by this labor-saving equipment.

The Acco Solenoid Chain Release can be ordered now in single or double spreader bar models. Accoloy X-Weld 125 Chain is normally furnished with both models although other types of chain are available upon special request. Spreader bar is sturdy I-Beam steel. Individual solenoid units without the spreader bar are also available. For complete information write our York, Pa., office.

ACCO Registered

SLING CHAINS

American Chain Division · American Chain & Cable Company, Inc.

Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

ACCO

For more facts circle 603 on Reply Card

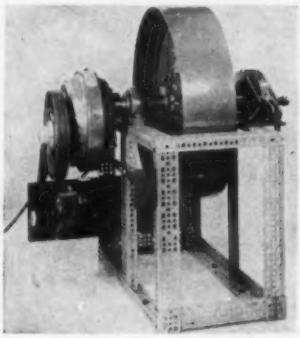
NEW PRODUCTS

(Begins on page 196)

face-to-face length, for working pressures of 150 to 250 psig. It can also be used for vacuum service. Type G pipe is suggested for piping systems handling corrosives liquids or slurries, as well as in air conditioning, heating systems. Bulletin 580 gives details. General Rubber Corp.

15—SPEED REDUCER has an adjustable torque arm

Available in two reduction ratios—13 to 1 and 20 to 1—and six capacities to handle fractional to 40 hp, the Offset Shaft King is a double-reduction, shaft-mounted speed reducer with adjustable torque arm. The input shaft is offset from the output



hub, a design providing a simple means of taking up belt stretch from the primary drive. Adjustable torque arms rotate the reduction unit about its output shaft—increasing or decreasing center distance between belt pulleys. Auxiliary motor rails for belt take-up are unnecessary. The Offset Shaft King mounts on the shaft of the driven machine by a tapered-bushing arrangement and is driven through a short centered Wedgbelt Drive by a motor of any make. It is adaptable to new or existing slow speed machinery. The American Pulley Co.

16—GEAR LUBRICANT aids in reducing wear

Molykote Type 223X, a heavy-duty gear lubricant available in SAE 90 and 140 grades, is made from solvent-refined paraffin base stock plus a formulation of E. P. additives which include Molykote Type M-55. It is said to provide satisfactory lubrication wherever the following problems are encountered: gear cases operating at excessive frictional temperatures, unsatisfactory wear life, and gears loaded beyond recommendations of gear

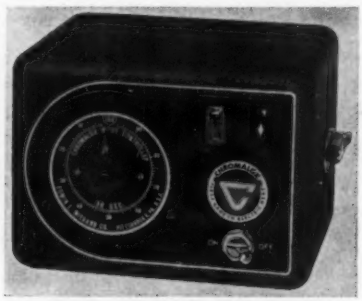
manufacturer. The lubricant is claimed to have equally good load carrying ability through entire range from lowest to highest sliding velocities. It has a viscosity index of 100, flash point of 390 F, ad fire point 420 F, contains a foam depressant and is corrosion and oxidation inhibited. The Alpha-Molykote Corp.

17—ALUMINIZED FABRIC stands heat, abrasion

Type 75 Scotch-Shield, an improved aluminized fabric for heat-protective clothing, is said to have greater resistance to wear and longer-lasting heat-reflective qualities than previously possible. Designed primarily for uses involving unusual abrasion and intense radiant heat, this material consists of a micro-thin layer of aluminum bonded to an asbestos weighing 1.2 lb per square yard. Manufacturer says it reflects more than 90 per cent of all radiant heat. Minnesota Mining and Mfg. Co.

18—INPUT CONTROLLER is easily installed package

Type VCP Chromalox Input Controller is a packaged master control panel for controlling electric input to heating loads where the mass of components and heating system are relatively large. It is rated 15 amp at 115 or 230 v. A factory wired unit



in a surface mounting box, with hinged cover, it comes complete with fused disconnect switch, 30-sec cycle, 15-amp input controller, indicating lights for line and load, and built-in terminal block. To install, you connect power supply to two line terminals and load circuit (up to 15 amp single phase) to two load terminals. Single phase loads over 15 amp and three-phase loads require a contactor. Edwin L. Wiegand Co.

19—FELT PADS reduce vibration and noise

Stanmount is a noise and vibration dampening material treated for indefinite use and re-use under ma-

When your profit hangs in the balance--it pays to be certain

• When finished products have to be moved, be certain—as this manufacturer was—that your materials handling men have the most exacting lifting tools available.

Anything else makes your operation a gamble. Can you afford to risk the loss not only of your profit, but the material and production time tied up in this unit?

Only with ACCO *Registered* Wire Rope Slings can you have the assurance of the 100% Dualoc Endings; the Certification that ALL PARTS of the Sling have been loaded under PROOF TEST to TWO TIMES the Rated Capacity; the Guarantee that all Attachments have strength equal to or in excess of that of the Wire Rope from which your sling is made. Only with ACCO *Registered* can you bring to your lifting operations the scientific exactness to protect your production schedules.

Find out how ACCO *Registered* Slings can protect your Men, Machines, Materials—and Profit.

Contact your nearest ACCO *Registered* Distributor or write us at Wilkes-Barre, Pa., for **Catalog No. 9**, containing 52 pages of strengths, dimensions and prices.

ACCO Registered
WIRE ROPE SLINGS

Wire Rope Sling Dept. · American Chain & Cable Company, Inc.
Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.
In Canada: Dominion Chain Company, Ltd., Niagara Falls, Ontario

ACCO

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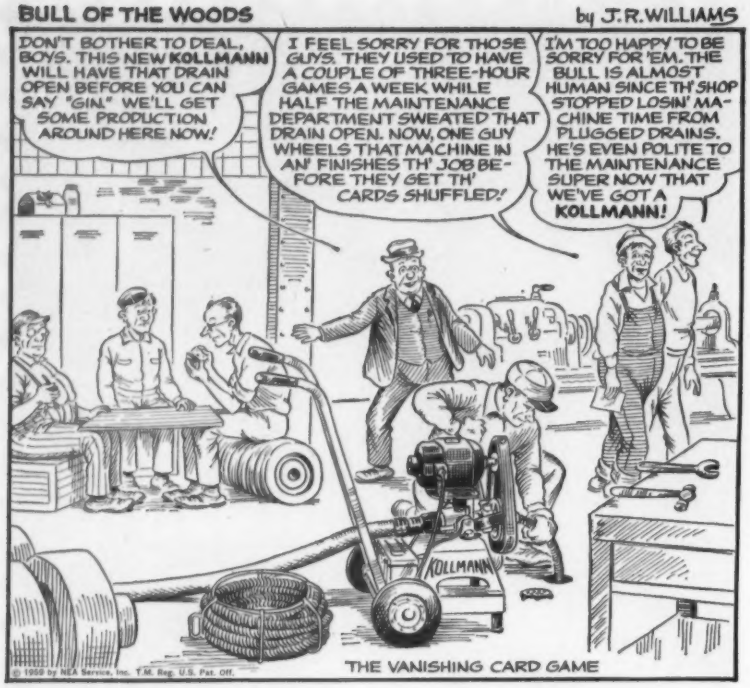
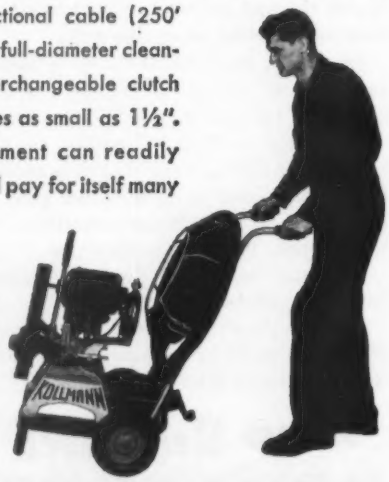
BULL OF THE WOODS by J. R. WILLIAMS


DON'T BOTHER TO DEAL, BOYS. THIS NEW KOLLMANN WILL HAVE THAT DRAIN OPEN BEFORE YOU CAN SAY "GIN." WE'LL GET SOME PRODUCTION AROUND HERE NOW!
I FEEL SORRY FOR THOSE GUYS. THEY USED TO HAVE A COUPLE OF THREE-HOUR GAMES A WEEK WHILE HALF THE MAINTENANCE DEPARTMENT SWEATED THAT DRAIN OPEN. NOW, ONE GUY WHEELS THAT MACHINE IN AN' FINISHES TH' JOB BE-FORE THEY GET TH' CARDS SHUFFLED!
I'M TOO HAPPY TO BE SORRY FOR 'EM. THE BULL IS ALMOST HUMAN SINCE TH' SHOP STOPPED LOSIN' MA-CHINE TIME FROM PLUGGED DRAINS. HE'S EVEN POLITE TO THE MAINTENANCE SUPER NOW THAT WE'VE GOT A KOLLMANN!
KOLLMANN
© 1959 by NEA Service, Inc. T.M. Reg. U.S. Pat. Off.
THE VANISHING CARD GAME

YES, THE KOLLMANN "500" CLEARS *Any* STOPPAGE QUICKLY...THOROUGHLY...

● Designed for industrial use, the "500" makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted "500" handles up to 150' of sectional cable (250' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1½". *Every* maintenance department can readily justify this machine... it will pay for itself many times over.



See the full Kollmann line at your distributor, or write for literature.

KOLLMANN
MANUFACTURING COMPANY
Erie, Pennsylvania • Phone: Erie 99-1102
Leading Designer and Manufacturer of Drain Cleaning Equipment Since 1936
For more facts circle 605 on Reply Card

NEW PRODUCTS

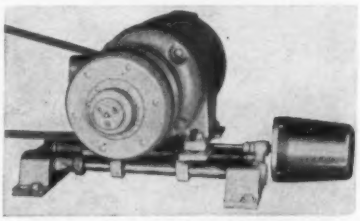
(Begins on page 196)

chinery. According to company, it is not affected by oil saturation, and has been treated to resist water and moisture conditions. Floors may be washed around machinery mounted on these pads. The material comes in sheet lots or cut pad sizes. Super-strength No. 580 adhesive used with Stanmount pads, will bond equipment with a vertical pull or shear equal to a minimum of 90 psi of mounting area, company states. Average cost per machine is reported less than $10.00. Hillman Equipment Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 279-280. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

20—ACTUATOR for sliding motor base drives

The SM-18 Shaftrol Actuator is designed to provide low-cost control for variable speed drives, valves, pumps, reactors and machine tools. It is avail-



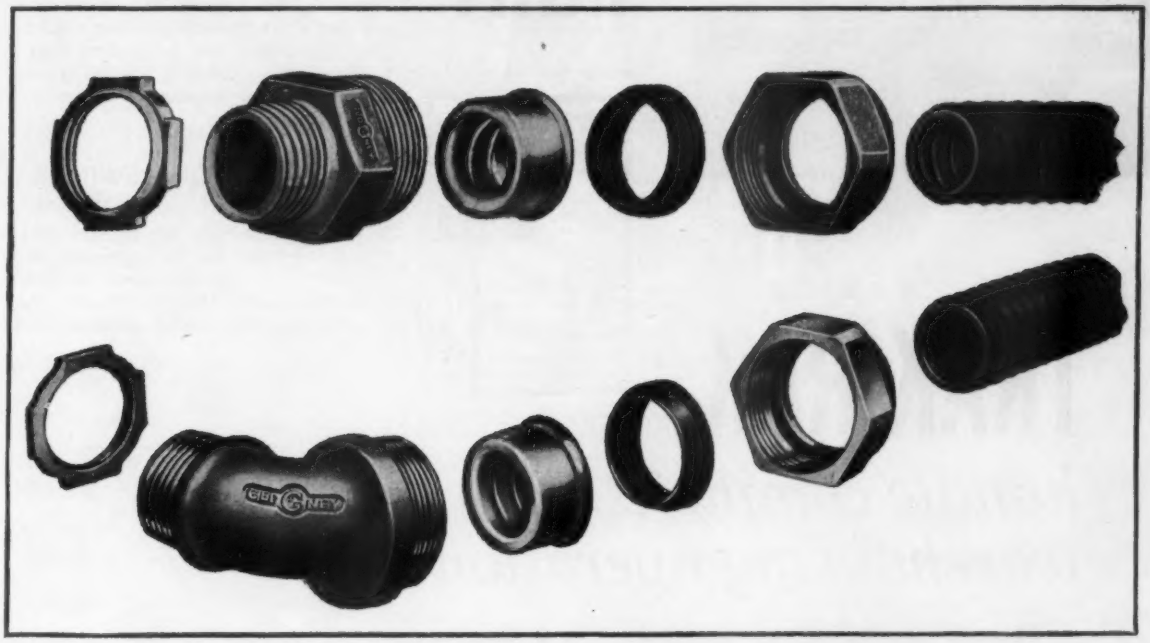
able with a built in precision potentiometer, gear connected to the output shaft through a wide choice of ratios, so that from 1/6 to 40 shaft revolutions corresponds to full scale control. The potentiometer provides remote indication of position on a dial or meter, or serves in automatic control circuits. Ratings to ¾ hp are available in single and three-phase styles with 500-w units, in two-phase, servo types. The Jordan Co., Inc.

21—REFRACTORY MIX for continual servicing needs

This refractory gunning mix is usable with all types of wet mix or nozzle mix equipment with low rebound. It can also be trowelled into place, and can be applied to either hot or cold walls. Claimed to possess excellent

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ¼" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

GEDNEY FITTINGS FIT!

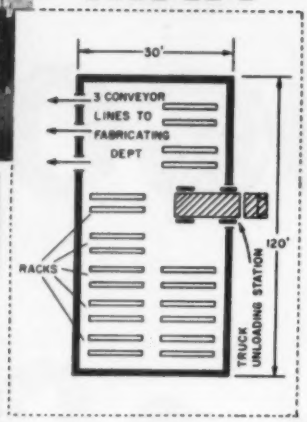
GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 606 on Reply Card

1 MAN ...and TRAK-RAK



handle complete warehousing operation

UNLOADS TRUCKS, STORES MATERIAL IN 1 OPERATION

When the Per-Fit Products Corp., Indianapolis manufacturer of aluminum windows installed a Chicago Tramrail TRAK-RAK unit in its warehouse, it gained 4 big advantages:

1. **Increased the capacity of existing storage area.**
2. **Reduced handling costs by permitting 1 man to handle the entire warehouse.**
3. **Kept production lines supplied with on-time material deliveries.**
4. **Handled high grade aluminum extrusions without damage.**

The TRAK-RAK unit installed at Per-Fit consists of a 1 Ton capacity underrunning crane from which is suspended an electrically operated rotating telescoping column which is fitted with a three-fork carriage. All operations of the TRAK-RAK unit are controlled by the operator, who rides with the carriage. The unit serves a series of self-standing racks equipped with arms which receive the bundled material. Because the TRAK-RAK column requires minimum operating space, the aisles between racks are very narrow.

Trucks delivering material are unloaded (top picture) by the unit, which moves over the tops of the racks (below) to the proper rack and deposits its load in 1 operation. When a particular bundle is required by production, the operator moves to the rack, picks up the bundle, and, moving overhead, travels to the conveyor lines (drawing) and sets the bundle down on the designated conveyor line.

TRAK-RAK Systems of vertical storage and handling are saving time and money in warehouses and production plants of all types. *For complete details on how TRAK-RAK can help solve your problems, write:*

CHICAGO TRAMRAIL CORPORATION

S. Kostner Avenue • Chicago 23, Illinois

For more facts circle 607 on Reply Card

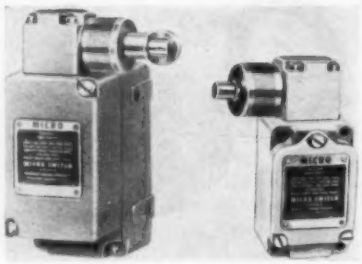
NEW PRODUCTS

(Begins on page 196)

abrasion and acid resistance, the material has a temperature range from 200 to 2500 F, fusion point P.C.E. Cone 29 (3020 F), and weight 118 lb per cu ft. Uses of the spray mix include coke oven doors and walls, soaking pit copings and other furnaces where periodic servicing is needed. It's useful, too, for making emergency repairs, keeping furnace in production until shutdown is feasible. Plibrico Co.

22—ACTUATOR SWITCHES can lie down on the job

These four oiltight side-plunger actuator switches are so compactly designed they can "lie down" in close quarters under cams and slides. The actuators—side roller plunger and

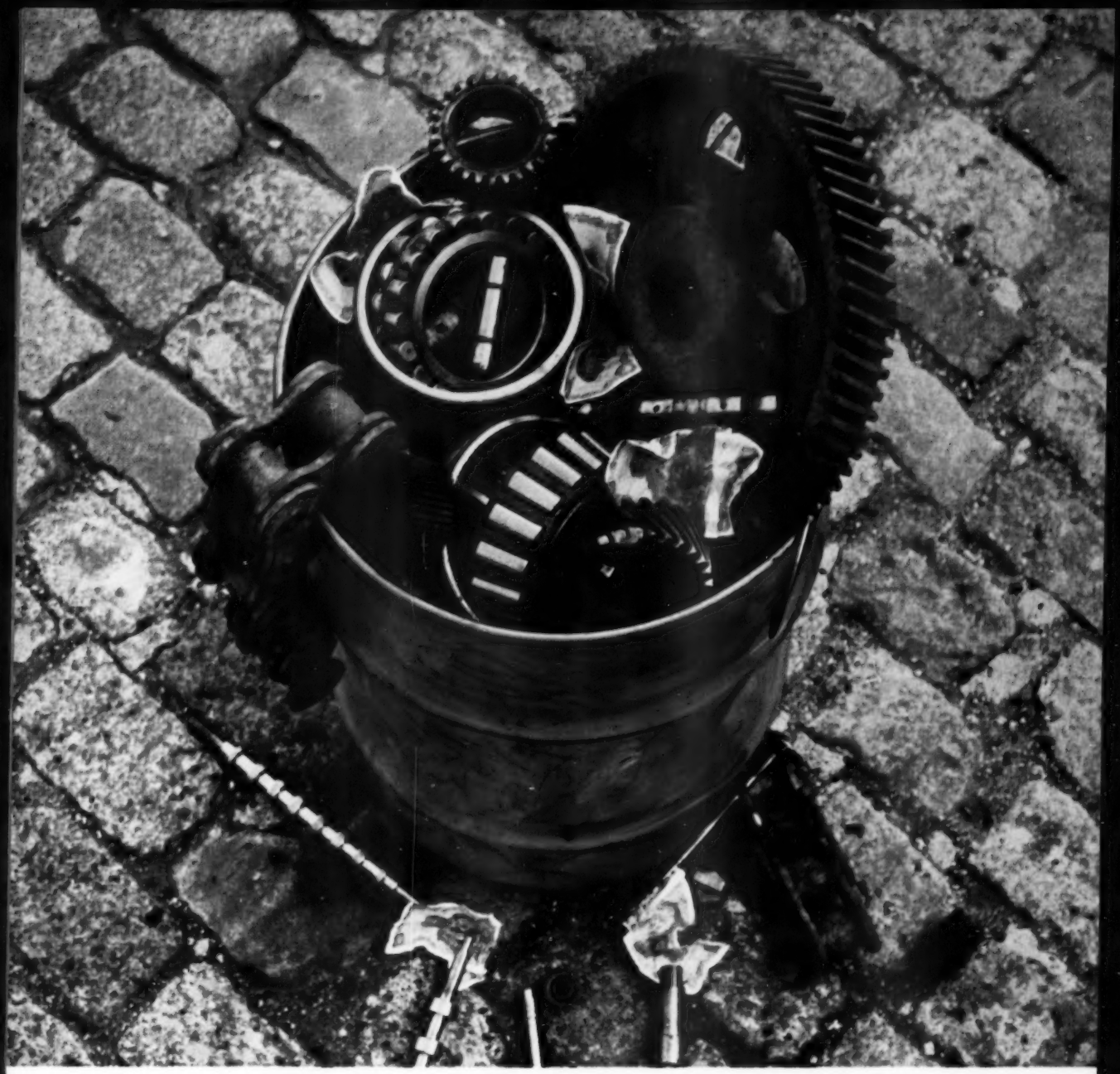


plain side plunger—are designed for use with company's Series LS and 200LS switches. Slide roller plunger versions (3LS1 and 203LS1) are useful for actuation by fast cams and slides; side plunger versions (4LS1 and 204LS1) find use where actuating motion is in line with plunger travel or with slow-moving cams and slides. Actuator heads may be mounted in four positions, 90 deg apart. Rollers on roller plunger switches may be rotated 360 deg, locking in any position. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

23—PROPORTIONING PUMP is small capacity unit

Proportioneers Model 1107 Adjust-O-Feeder provides low-cost injection of treatment for smaller, low-pressure boilers—for treating make-up water, or for constant feeding at low rate. It is also suitable for proportioning of chemicals in water and sewage treatment, chemical and food processing etc. Design features include adjustable stroke length to give feed rates from 0.2 to 2 gph into 300 lb maximum discharge pressure. Check valves used are self-purging, straight through de-

For more facts circle 608 on Reply Card



TEXACO ORGANIZED LUBRICATION CAN HELP YOU...

End replacement parts waste

One Northeastern manufacturer replaced parts in a major machine every two weeks—a not uncommon practice in industry today. He marked it off as a normal maintenance expense. It wasn't really—it was the result of faulty lubrication practices. A Texaco Lubrication survey spotted the trouble—solved the problem. Now the manufacturer operates with a Texaco Organized Lubrication Plan—and the trouble no longer exists.

Chances are the same thing is happening in your plant right now—It doesn't have to.

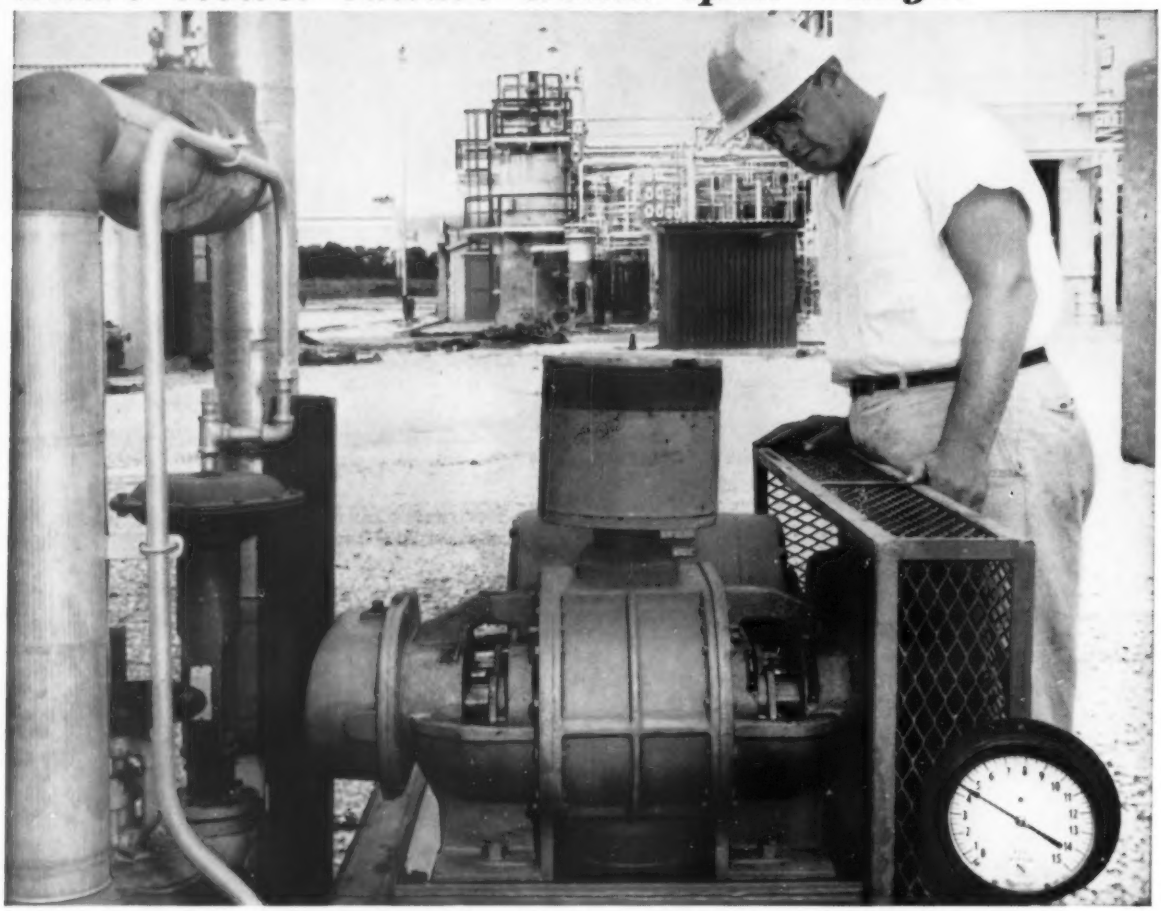
A Texaco Organized Lubrication Plan can extend parts life significantly—saving thousands of dollars in replacement parts and even more in uninterrupted production for longer periods.

Get full details on Texaco Organized Lubrication from your local Texaco Lubrication Engineer. He can supply you with a copy of "Management Practices that Control Costs via Organized Lubrication." Or write:

Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. E-111.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

where blower failure would spell Danger



Sutorbilt blower at Polymer Chemicals Division plant in Baton Rouge, La. Blower is required at a critical phase of catalyst activation in a new Phillips-type polymerization process.

W. R. GRACE DEPENDS ON A SUTORBILT ROTARY, POSITIVE-PRESSURE BLOWER

At W. R. Grace & Co.'s new Polymer Chemical Division, the catalyst for a new, high-density polyolefin production process must be protected in a pressurized air stream. A doubly-dependable Sutorbilt rotary positive-pressure blower was selected for these three important reasons:

1. Contamination must be avoided
Long-lasting, air-tight, Teflon seals and lack of lubrication in compression chamber prevent air contamination in a Sutorbilt blower.

2. Breakdowns would be dangerous
Simple, rugged, precision construction (only rotors and bearings move) means reliable service. Unit chosen by Grace has been in continuous operation for well over a year without repairs.

3. Pressure must be positive, constant
The two, counter-rotating "figure eight" Sutorbilt impellers produce a positive-pressure, *metered* air supply.

Sutorbilt blowers and gas pumps are precision-built to deliver air or gas in capacities up to 20,000 cubic feet per minute—at pressures up to 10 pounds. Write today for complete, illustrated literature on these efficient, dependable blowers. 1349 S-16

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SUBSIDIARY OF FULLER COMPANY • CATASAUQUA, PA.

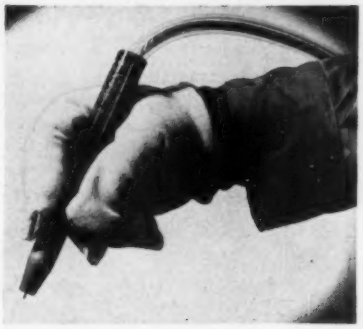
For more facts circle 609 on Reply Card

(Begins on page 196)

sign. The unit proportions amines, caustic, disodium phosphate, poly phosphates, sodium sulphate, other chemicals. It operates on 110 v, 60 cycles, has a built-in reduction gear box and thermal overload protection. B-I-F Industries, Inc.

24—PENCIL-TYPE HOLDER for light gage welding

This manual holder is for Heliwelding (a tungsten-inert-gas welding process) of light gage ferrous and non-ferrous metals. Principal advantage of the 100-amp air-cooled holder is its body

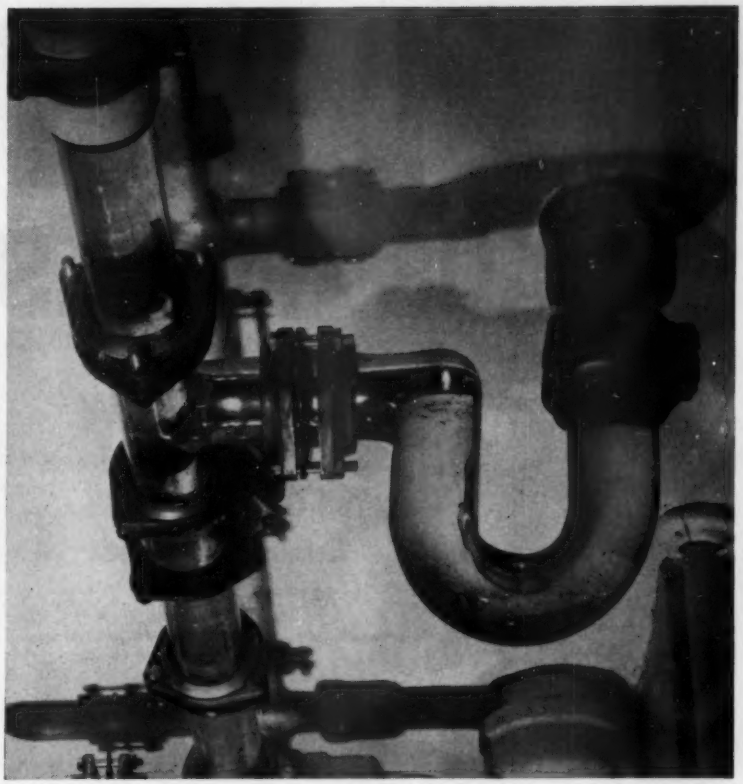


design—it's shaped like a large lead pencil and can work in hard-to-reach spots. Designed specifically for those who work continually with metals—including aluminum and magnesium—⅛ in. thick and less, it accommodates tungsten electrodes from 0.020 in. through 3/32 in., lengths to 3 in., and can be used with argon, helium or mixtures of these. Air Reduction Sales Co., Air Reduction Co., Inc.

25—TRANSISTOR SYSTEM controls temperatures

Continuous, automatic, temperature control in both liquid and air baths to a tolerance of ±1 per cent is announced for this transistorized control system. According to manufacturer, it permits unattended operation without interruption for days, if necessary, is applicable wherever a mercury thermometer can be the primary sensing element, and is available at a fraction of the cost of many systems doing a comparable job. Effective temperature range is —38 to 340 C. The system is suggested for use in reactions, fractionations, distillations, other processes. It can be coupled with a strip chart recorder to provide a continuous temperature history.

The system consists basically of a



At Cornell University you'll find almost 2000 feet of PYREX pipe used for drainlines that must handle corrosive wastes.

LOOK! NO LEAKS!

How Cornell University solved the problem of drainlines for corrosives

Drainlines from the second floor School of Nutrition lab in Cornell's Savage Hall run along the ceilings of the first floor offices. Here, faulty joints were leaking corrosive damaging wastes.

So out came the leaky lines and joints. And in went 700 feet of PYREX brand glass pipe.

The people at Cornell have already learned about PYREX glass pipe from the 1200 feet that has been installed in Cornell's Baker Laboratory of Chemistry.

With PYREX pipe *in*, corrosion is *out* because this pipe is made from a glass that is *not* bothered by most acids or alkalies. No corrosion means no leaks. And no leaks means no costly patchwork maintenance.

If you visit the Cornell labs, you'll *see* at a glance (this is *transparent* pipe) that all kinds of wastes go through—like litmus paper, cork, and pieces of tubing. If by chance blockage does occur—a rare happening because glass is so *smooth*—you can spot it at once, without costly dismantling.

Finally, you will find that glass pipe is easy to install. Light in weight, it requires fewer hangers than lines made from other conventional materials. And you can get pipe and fittings in all the sizes you need.

For complete details, send for Bulletin PE-30, "PYREX® pipe for drainlines." Write to Plant Equipment Sales, Corning Glass Works, 10 Crystal St., Corning, N.Y.

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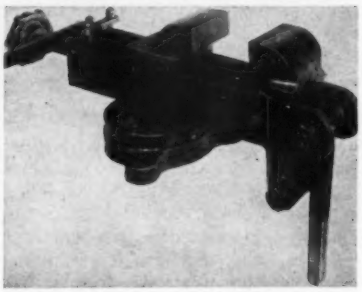
NEW PRODUCTS

(Begins on page 170)

transistorized crystal controlled oscillator circuit stabilized against voltage variation and ambient temperature changes. It senses the mercury column position through an electrode attached to the outside of a thermometer, without contact with the mercury. The signal from the thermometer oscillator actuates a modulated duration pulse controller, providing a zero dead band control system. Because of its electrical pulse circuity this system offers freedom from cycling, it is pointed out. It indicates and controls currents up to 1500 w (higher with auxiliary relays). Milltown Instrument Co.

26—BENCH Vise with open-center construction

While constructed to take the same loads as a conventional heavy-duty vise, the Po-Ko-No has no obstruction beneath the jaws. It incorporates a quick-change device designed to enable setting and maintaining jaws at a predetermined position. Pieces of the same size may be clamped and released from jaws with a flick of a cam lever. A variety of jobs can be handled vertically as well as horizontally. The vise is available in three sizes: 3 in. jaws with opening to 5 in.; 5 in. jaws with opening to 9 in. and 6 in. jaws with opening to 10 in. Stroudsburg Engine Works, Inc.



27—TRANSFER SWITCH is solenoid operated unit

T-100A, an automatic transfer switch, employs a dual circuit breaker design utilizing two opposing solenoids through a common transfer linkage for transfer power. The two-position switch is designed for automatic transfer of power and light service to an emergency source in event of failure of the normal source, with the load automatically returned upon normal restoration. Available to 600 v, 100 amp, this switch affords interrupting

ROTATING & RECIPROCATING MACHINERY

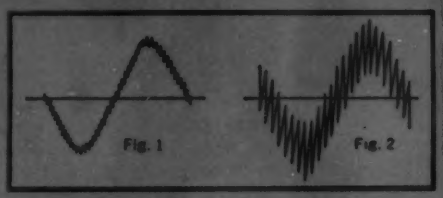
breakdown? downtime!

UNFORESEEN DELAY – MONEY LOST

New Vibraswitch 66...the Robertshaw Early Warning System that guards against extensive machinery damage

Despite the best preventive maintenance program, unforeseen machinery damage does occur. Excessive vibration is frequently the first indication of impending damage in rotating and reciprocating equipment. When harmful vibration is detected at an early stage, damage can be sharply reduced, limiting both downtime and repair costs. Latest of the industry-accepted Vibraswitch Series, the new Vibraswitch 66 provides a low-cost method of directly sensing destructive vibratory forces.

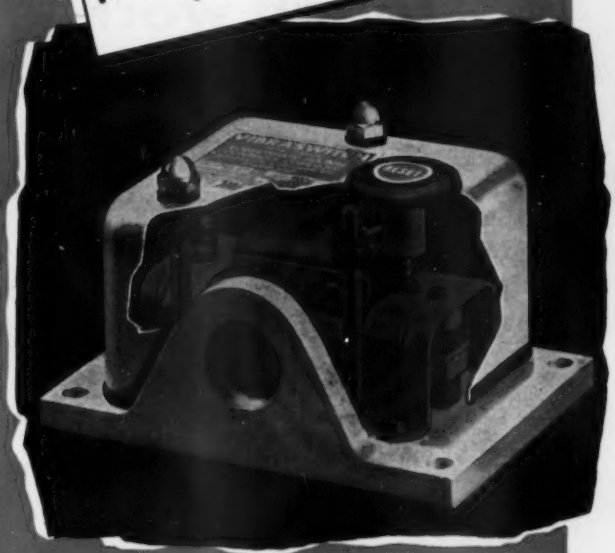
OPERATION—Machinery damage caused by excessive vibration begins with unbalance of various magnitudes. When defining the destructive characteristics of excessive vibration, it is necessary to consider both amplitude and its secondary derivative, acceleration. Figure one, normal operation, represents fundamental rotational frequency superimposed with higher frequency, low amplitude noise or chatter occurring in such vital parts as bearings and gears.



Too frequently, however, these vital parts fail, causing an increase in amplitude occurring primarily in the secondary, higher frequency vibration component, (see Figure two). Extensive damage can be prevented by early detection of these destructive forces. Robertshaw Vibraswitches detect both fundamental unbalance and harmful secondary vibration, providing twofold protection shared by no other known device.

FEATURES—Standard: maintenance-free—no moving parts (except when actuation occurs)—manual reset—wide range sensitivity adjustment—provision for shutdown or alarm. Optional: remote reset—starting or running time delays—multipoint operation.

Now less than $100 buys automatic malfunction detection



APPLICATIONS: Pumps, compressors, gas and steam turbines, centrifuges, motors and generators, diesel and gas engines, fans and blowers, gear boxes, and other rotating and reciprocating machinery.

MODELS: Vibraswitch 66—for unsheltered non-hazardous locations requiring water tight equipment. Vibraswitch 65—for hazardous locations requiring explosion-proof equipment.

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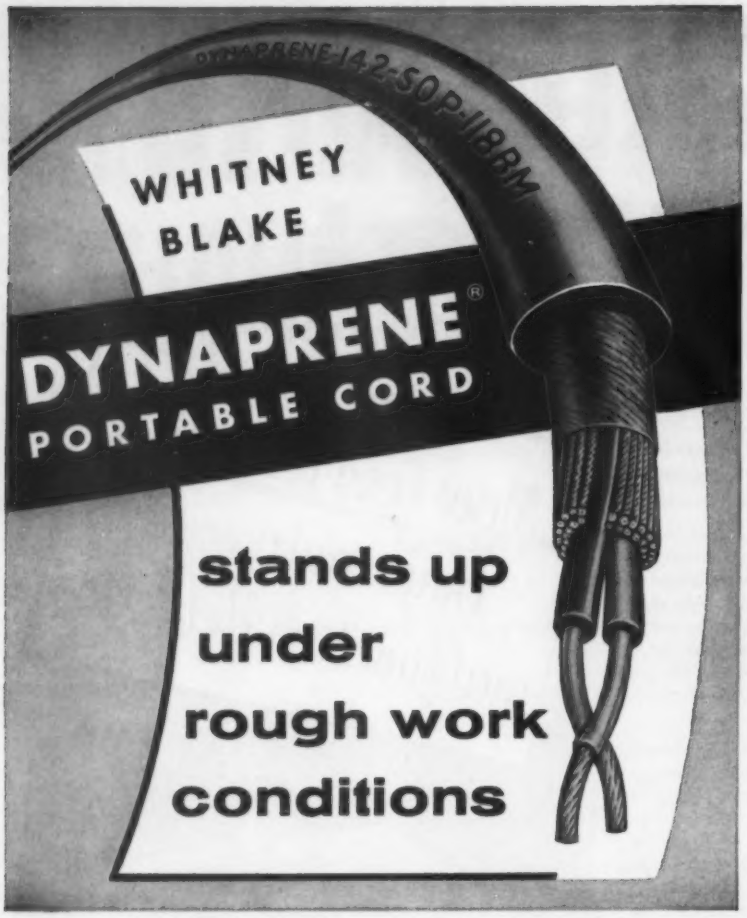

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NEW PRODUCTS

(Begins on page 196)

capacities to 10,000 amp rms. It operates by power from side to which load is transferred. The actuated solenoid throws a mechanically interlocked transfer bar, opening one breaker while closing the other. When again actuated, the second solenoid returns the bar, restoring the breakers to their original positions. The switch is electrically operated and mechanically held with no neutral position possible, it is pointed out. It is available for ratings to 600 v a-c and 250 v d-c. Lake Shore Electric Corp.

28—CHAIN ASSEMBLER lift magnets safely

Accoloy 125 Steady-Lift Magnet Chain Assemblies are designed to accommodate electrically-energized magnets of all sizes and lifting capacities. Because of the rigid section of the master link, the crane operator can pick up or deposit the assembly at

any location without handling by a crane follower. Tripod construction serves to prevent chain damage due to twisting. Legs are field replaceable, being connected to the master alloy casting with square-end pins, which aid in preventing rotation.

Fabricated of durable alloy steel components, these units are available in 1- and 1¼-in. chain assembly sizes. The 1-in. components accommodate magnets less than 60-in. diam; the 1¼-in. unit for those of 60-in. diam; and larger. Both have a 7-by-12 in. erect master link for standard crane hooks. American Chain Div., American Chain & Cable Co., Inc.

29—SOLDER BALLS for automatic soldering

These spherical preforms are manufactured from the solder systems of tin-lead, indium, silver, precious metals, and fusible alloys containing bismuth and cadmium to suit any spe-

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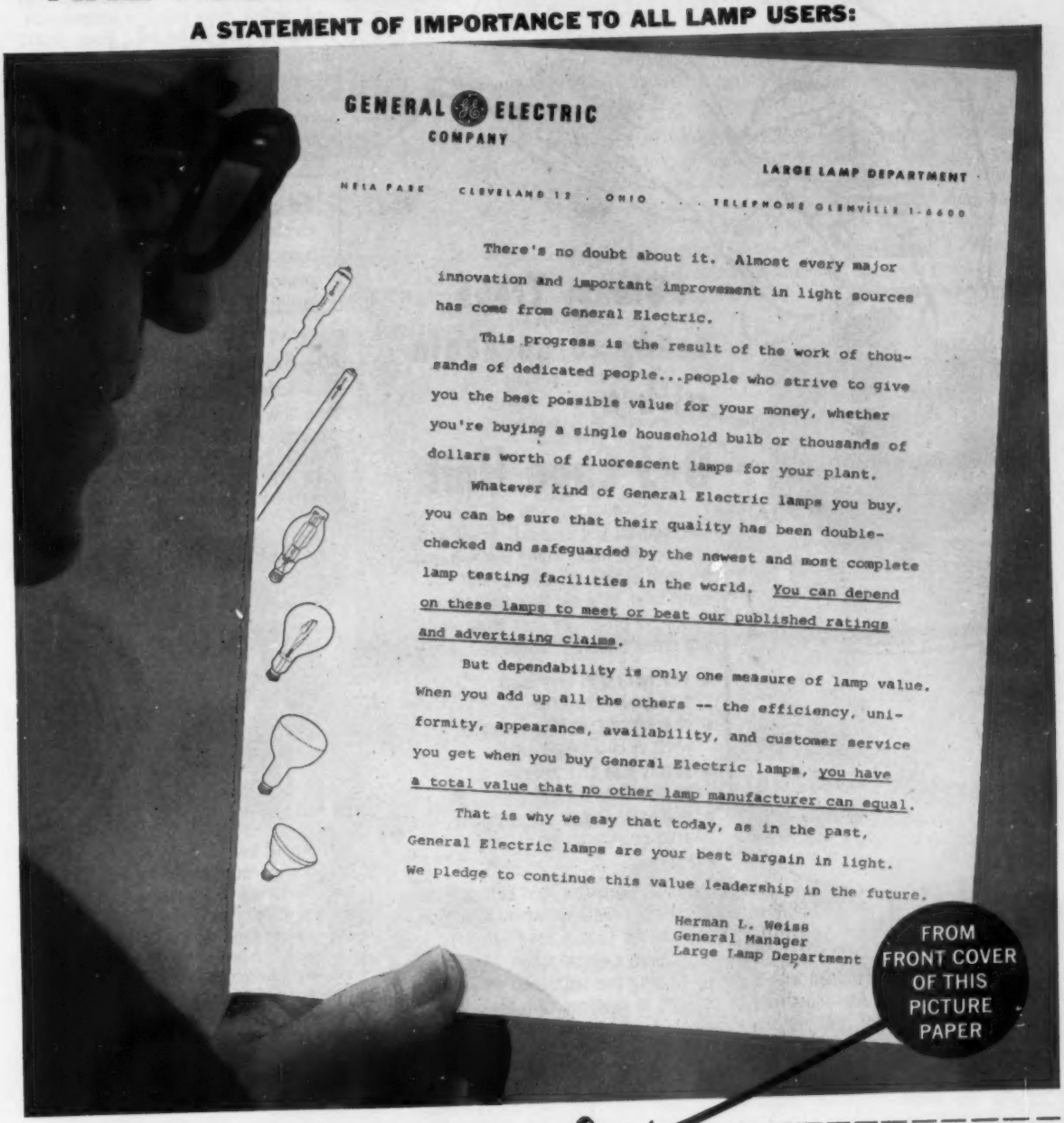
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- **REMOVE** the cap right on the line
- **REPLACE** the interior with a B-J cage unit
- **RECAP** the trap assembly
- **RENEWED** . . . all new and ready to go

It's as easy as replacing a light bulb and the cage unit element is always where it belongs for rapid response to trap conditions. For in this modern unit, a quick-action, completely accurate bellows is combined with a perfect-fit plug and seat, then enclosed in a sealed monel cage. And there may be no need to dispense with your present steam trap investment. B-J industrial cage units can probably be installed in your present thermostatic traps or used in a complete B-J system.

For the complete story on steam trap functions and maintenance — write today for "The Steam Trap Primer". You'll see the 'hows' and 'whys' of steam trap performances. And perhaps you'll see how B-J cage units can end your steam trap problems.

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BARNES & JONES, INC.

34 Crafts St. • Newtonville 60, Massachusetts

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NEW PRODUCTS

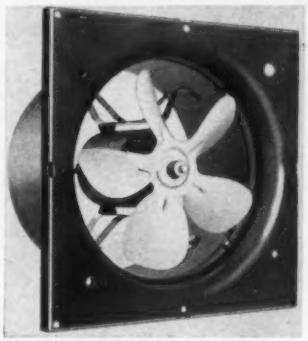
(Begins on page 196)

cific temperature and strength requirement. Because they are ball shaped, these forms can be loaded into jigs and rolled into place automatically. Available in diameters from 0.002 through 0.125 in. and claimed dimensionally accurate to ±0.001 in. and better, these spheres are designed to assure a correct volume of solder. Alloys Unlimited, Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 279-280.

30—TUBEAXIAL FAN ventilates electronic equipment

This low cost, lightweight tubeaxial fan (No. 89B222) is designed specifically for ventilating electronic equipment. It may be used for cubicles, racks and cabinets housing such



equipment and is suggested for use in stationary equipment where shock and vibration are negligible. Mounted in an open type enclosure, this unit has sleeve-type bearings, is powered by a 1/70-hp shaded pole electric motor operating on 115-v, single-phase 60/50 cycle current. At rated speed, it delivers 450 cfm of air at zero static pressure, 100 cfm at about 0.22 in. wg static pressure. It weighs 8 lb, installs in a 9-in. circular opening with 11½-by-11½ in. plate. Industrial Div., American Standard.

31—ALUMINUM ENAMEL covers in one coat

Super hiding properties are announced for Silver Knight 92. It is claimed ideal for restoring old space, to cover any wall or ceiling surface in one coat and completely hide old paint, blemishes, even tar and asphalt from bonding ad-

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This Standard Oil product made better grinding possible at Cessna

Aircraft Company's Industrial Products Division licked three problems with ARGON Oil No. 4

Situation: A fluid used in grinding operations at this Cessna plant at Hutchinson, Kansas, was creating three problems:

1) It washed the lubricant from regulator wheels and grinding fixtures, causing them to freeze.
2) It caused build-up of deposits.
3) It stripped paint from machine surfaces.

What was done: Cessna management called in a Standard Oil lubrication specialist who recommended ARGON Oil No. 4 in ratios of 100 and 150:1 for test. The coolant was tested in two centerless grinders for two months.

What happened: All three conditions which were hampering operations were cleared up when the switch was made to ARGON Oil No. 4. Cessna also found that work remained rust-free after passing through the machines, something that had not been the case before. They also found that the coolant didn't foam. With no foam, more of it stayed on the wheel, resulting in cooler operation. Faster cuts were obtained with finer wheels. All 12 grinders in the Cessna shop were then converted to ARGON Oil No. 4.

What you can do: Get more facts about ARGON Oil No. 4 from the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about **ARGON Oil No. 4**

• Clear, transparent fluid • Able to control corrosion and rust on work and machines • All chemical. Does not support bacteria growth • Unaffected by humidity • Fire resistant • Odorless

Jerry Croes, Standard Oil staff engineer, Paul Hoyer, Cessna section superintendent and Bill Ray, Standard Oil lubrication specialist (l. to r.) inspect rust-free finish after grinding with ARGON Oil No. 4 while J. E. Petrie (far left), operator, looks on. Both Jerry Croes and Bill Ray have plenty of experience in this sort of work. Jerry has been at it for 16 years. He has an engineering degree from South Dakota School of Mines & Technology and has completed the Standard Oil Sales Engineering School. Bill has six years service working with industrial customers.

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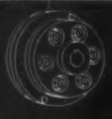
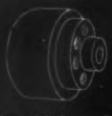


Ajax Type SP Shear Pin Coupling

Ajax Type BO Bolt-On Coupling

Ajax Type M Mill Motor Coupling



Ajax Type BD Brake Drum Coupling

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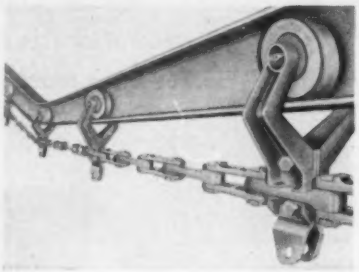
NEW PRODUCTS

(Begins on page 196)

hesives. Brushed or sprayed, this aluminum enamel is always a one-coat job, says manufacturer. Spray application is recommended on rough, uneven surfaces. Pace Products, Inc.

32—CHAIN CONVEYOR affords handling flexibility

The R-W 458 Overhead Chain Conveyor consists of a Keystone rivetless type endless chain supported by load carrying trolleys which roll on the lower flanges of a 4-in. I-beam type track. The chain is mechanically



propelled and supported at horizontal turns by a series of rollers or wheels, while the track absorbs the thrust or vertical bends. Along with basic components of the system, manufacturer offers accessory equipment including drive units, take-up units, power-pack, traction wheel turns, roller turns, and attachments. This conveyor is reported applicable to light or heavy loads and tow conveyor installations, and equally adaptable to level or multiplane systems. It may be added to present systems of similar design. Catalog A-570 gives details. Richards-Wilcox Mfg. Co.

33—REGULATOR for heating and cooling services

Designated Class M (direct acting) for heating service, and Class MP (reverse acting) for cooling service, these temperature regulators come in ¾- and 1-in. body sizes in cast iron or bronze with screwed ends. They are self-contained and self-operated. Their design includes a balancing bellows which permits smooth functioning at inlet pressures and pressure drops up to 100 psi. Also announced is a self-aligning, single-seated tight closing main valve guided throughout its entire stroke.

Variations in temperature are sensed by a liquid filled thermo-element. A variety of thermo-elements with various ranges, spans and bulb materials are available. Elements can

One slip can cost more than USS Multigrip...

What percentage of occupational accidents is caused by falls? In one state, falls were responsible for 17 per cent of all injuries, 33 per cent of the days lost and 23 per cent of the direct cost. (From National Safety News, February, 1959.) Falls ranked No. 1 as the cause of most accidents.

Fortunately, you can do something to prevent falls by installing USS Multigrip. Multigrip floor plate provides safe traction in any direction. It is studded with little cleats that are flat on top and do not catch the shoe.

For dangerous locations such as machine shops, loading platforms, stair treads and catwalks, USS Multigrip supplies safety plus.

Saves money, too! Where floors take a pounding from heavy traffic, Multigrip will stand for years under constant use. There's little or no maintenance.

On your next inspection trip, search out the hazardous locations—and make them safe with USS Multigrip.

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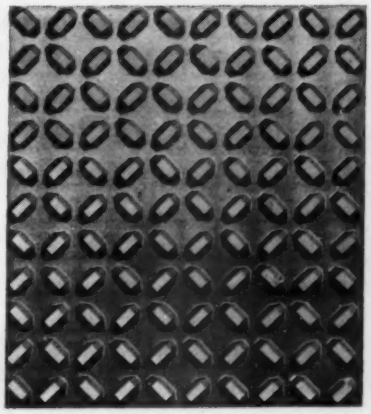

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In Dust Collection Systems...

SF Precipitator at a steel plant.

design
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Higher efficiency of Buell 'SF' Electric Precipitators is the result of exclusive engineering features. For example, Buell's *Spiralectrodes* emit 50% to 100% more electrons than other types . . . and *maintain* their efficiency. Positive gas flow control through adjustable baffles prevents scouring and eddying. And Buell's Unique Continuous Cycle Rapping practically eliminates "puffing".

BUELL CYCLONES

Lower installation cost of Buell's time-proved simplified design makes erection faster and easier. Spiralectrodes, for example, are self-tensioning, require no weights. Flexibility of power supply means easier installation, operating safety.

"SF" ELECTRIC PRECIPITATORS

Lower maintenance cost is the result of many details of superior design. And sectionalized design permits shutting down part of a unit without interrupting service in the rest of the unit.

Get full information: write for a copy of "Buell SF Electric Precipitators", a 22-page booklet. Write to Dept. 14-I, Buell Engineering Co., Inc., 123 William Street, New York 38, N. Y.

PRECIPITATOR-CYCLONE COMBINATIONS

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Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 196)

be readily interchanged. Applications include instantaneous heaters and coolers, shell and tube or shell and coil heat exchangers, process heating and cooling, space heaters and air conditioning systems. Bulletin 591 gives details. Leslie Co.

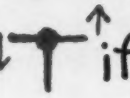
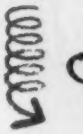
34—NON-CLOG PUMP can be submerged in sump

This submersible model of the Wemco Torque-Flow Pump incorporates the same recessed impeller used in standard models and is claimed completely non-clogging. Pump and motor assembly can be lowered into the

sump by means of lifting lugs on motor housing. Designed with a close-coupled motor for compactness and mobility, this pump comes in both 3- and 4-in. sizes; the latter is only 18 in. in diameter and 28 in. high, including motor. Supporting legs, cast as part of the pump casing, are designed to elevate the intake port from the sump bottom and are shaped to lessen possibility of congestion. Wemco Div., Western Machinery Co.

35—SOLENOID AIR VALVE can be hand controlled

This solenoid valve can be actuated by hand, whether the coil is energized or de-energized. The dual function of the valve makes it suitable for all low pressure air systems (to 150 psi), company says, whether manual control is part of normal production set-ups or needed only on rare emergency occasions. On die-setting and clamping operations requiring skill and judgment it gives the convenience of manual control during the set-up stage before letting power operation take over. On jobs where cement, powdery, or granular substances are handled, manual override enables operator to work hopper doors and free a sticking batch without inter-

If it rolls on an axle or turns in a bearing or rides on a shaft
if it slides in a groove or moves on a pivot  if it bores  or cuts or transmits pressure
one of Sinclair's 500 specialized lubricants is designed to make it work better.
For answers to your lubrication problems, write today to

SINCLAIR REFINING COMPANY

Technical Service Division
600 Fifth Ave, N.Y. 20 N.Y.

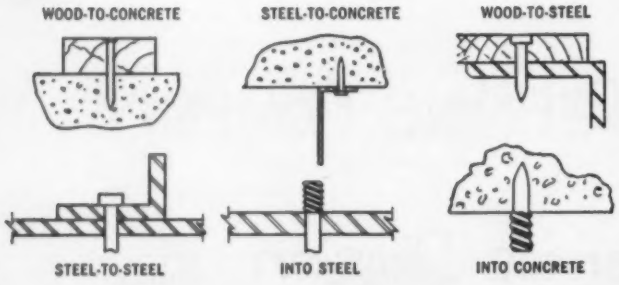
For more facts circle 620 on Reply Card

ONLY RAMSET

"covers all the bases in powder-actuated fastening"

This statement has been made by hundreds of contractors, architects, electricians, plumbers, maintenance men, supervisors, foremen and others over the past ten years! Whatever the job, if it involves fastening into concrete or steel Ramset can do it more easily, efficiently, and with a lower in-place fastener cost.

Threaded studs, drive pins, eye pins—over 100 specialized fasteners team with ten types of powder charges to assure you of just the right holding power for each job. It will pay you to get more details. Your Ramset dealer is listed in the Yellow Pages under tools . . . call him today! •



In addition to powder-actuated fastening, the versatile Ramset System includes Shure-Set® hammer-in tools for light fastening, and Ringblaster® heavy-duty kiln gun.

Ramset Fastening System

WINCHESTER-WESTERN DIV. • OLIN MATHIESON CHEMICAL CORPORATION
12133-1 BEREA ROAD • CLEVELAND, OHIO

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 196)

rupting electrical cycle. For situations where manual control is merely an emergency feature, manual level can be safety-wired to prevent accidental actuation. Barksdale Valves.

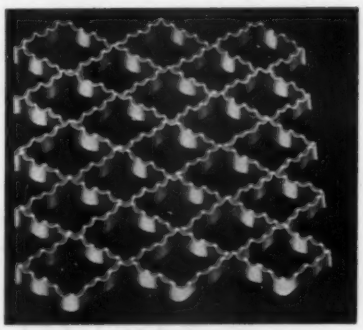
36—FLOODLIGHT simplifies relamping, cleaning

By adjustable stops, Type MVE-20 1000-w Mercury Vapor Floodlight can be turned around or tipped over

for relamping and cleaning, and returned to its original setting. Both horizontal and vertical degree scales are provided, to permit aiming at pre-determined angles at time of installation. Reflector and lens are of 20-in. diam. Crouse-Hinds Co.

37—SAFETY GRATING and all-purpose grille

Protecto is a safety grating and all purpose grille. The basic assembly consists of descaled, skid-proofed bars formed into a honeycomb design and welded by a hydro-electric pressure method. The result is described as



a sturdy, lightweight grille assembly on which floor or stress load is evenly distributed over a wide area. Grating features a plain surface on one side and on the other a non-skid serrated edge designed to eliminate slipping in

Nothing takes a bigger beating than your floors...

Only Masterplate floors take this concentrated traffic

2,000,000 lbs. of food are received, stored and shipped in a single day at this Purity Stores, Ltd. warehouse

Where long floor-life and cleanliness are musts (as in this 7 acre Purity Stores, Ltd. warehouse) MASTERPLATE "iron-clad" floors do the job better and more economically.

The thick, tough MASTERPLATE floor surface easily withstands the severe day-in, day-out abrasion of 234 tow conveyor trucks (with capacities up to 4000 lbs.). Food stuffs rolling out of Purity's warehouse to over 100 retail outlets are cleaner . . . because the MASTERPLATE floor does not "dust".

A MASTERPLATE floor costs less because:

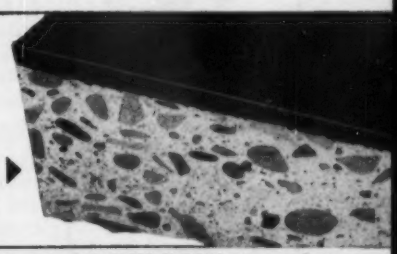
- It lasts 4 to 8 times longer than the best plain concrete floor.
- It virtually eliminates costly shutdowns or interruptions.
- It costs less to keep clean.

Before you install or replace another floor, call in the local Master Builders fieldman for full information. Our unique "Floor Package" includes not only a *superior product*—MASTERPLATE—but 50 years of *application experience* on all types of installations, plus *on-the-job service* by a skilled MASTER BUILDERS field man.

The Master Builders Company, Cleveland 3, Ohio
Division of American-Marietta Company
The Master Builders Co., Ltd., Toronto 15, Ontario
International Department, New York 17, New York
Branch offices in all principal cities.

MASTERPLATE provides a thick . . . tough . . . malleable "iron-clad" floor surface.

CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.



"TRACER LIGHTS" show typical, continuous, heavy floor traffic pattern of the "in-the-floor" tow conveyor trucks at Purity Stores, Ltd., Burlingame, California. • Chief Engineer—Purity Stores, Ltd.: Arthur Allison • Structural Engineer: H. M. Engle, San Rafael, California • Design Consultant: Harry Weese, Chicago, Illinois • Contractor: Younger Construction Company, San Francisco, California • POZZOLITH Ready-Mixed Concrete: Consumers Rock and Cement Co., San Francisco, California.

FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors—MASTERPLATE withstands impact . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times* according to tests by top independent testing authorities.

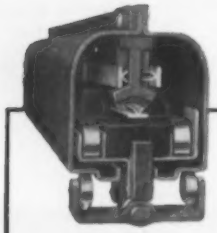
MASTER BUILDERS®
MASTERPLATE*

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing "iron-clad" concrete floors.*

For more facts circle 622 on Reply Card

4 EQUALLY GOOD REASONS

...why your cranes and hoists should be FEEDRAIL® powered



Throughout industry, flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control

1. Safe electrification. Feedrail conductors are protectively enclosed in steel – no exposed wiring, no trailing cables. You enjoy maximum protection for personnel and equipment.

2. Minimum maintenance. Elimination of frayed, sagging, broken wires means safer, less frequent maintenance.

3. Better materials handling. There are no time consuming traffic holdups with Feedrail. Fewer accidents, less maintenance mean absolutely minimum down time – more efficient materials handling.

4. Lower operating costs. Elimination of hazardous, wasteful working conditions not only leads to better performance but improves safety records and plant morale as well – eventually lowers insurance costs too.

A Feedrail "moving power system" will fit your crane or hoist's needs – can be installed quickly and easily. Get full information. Write today to Dept. P-9.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

TB

ELECTRIC FEEDRAIL®

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N. Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 623 on Reply Card

NEW PRODUCTS

(Begins on page 196)

direction of bearing bars, even when submerged in grease. It is available in a wide selection of widths, in lengths of 9 ft. Bustin Steel Products, Inc.

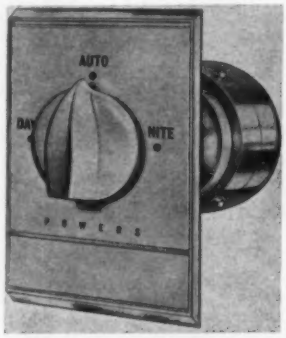
38—PAINT REMOVER is wet, workable for 12 hr.

Turco 4377B, a brush-on, water rinseable paint remover, is claimed to remain wet and workable for a day or longer, to strip deeper and more completely. One coat is sufficient in most cases to remove 10 layers of paint, says manufacturer, and no surface agitation is required. Since it thickens when standing and thins when agitated Turco 4377B clings to vertical and over hanging as well as horizonaal surfaces, it is pointed out. It is announced as non-flammable, safe, non-corrosive on all common metals. It also removes varnish, lacquer, enamel. Turco Products, Inc.

Use the Reader Service Cards provided on pages 279-280 to ask for more information on the products. Circle item numbers of all of the products in which you are interested.

39—SELECTOR SWITCH provides easy operation

For directing or stopping flow of compressed air to pneumatic motor and valves, this remote selector switch is 10 per cent smaller than former models and is designed to



match company's positioning switch announced earlier this year. By replacing leather with Teflon plastic for the disc in the switch body, friction and air leakage have been reduced and the selector knob is easier to turn, company says. The selector switch

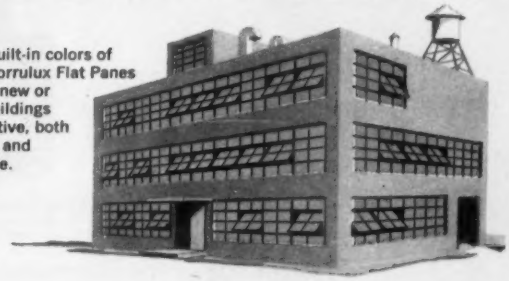
Reglaze for the last time with Johns-Manville Shatterproof *Corrulux*® Flat Panes

Johns-Manville shatterproof Corrulux Flat Panes are the logical and economical solution to the frequent, costly replacement of ordinary window panes.

Corrulux Flat Panes are composed of a superior, tough, weather-resistant plastic reinforced with thousands of high-strength glass fibers. They defy breakage associated with glass factory windows caused by vandalism, accidental damage and typical factory vibrations.

Being translucent, Corrulux Flat Panes admit and diffuse daylight, eliminate harsh glare and provide privacy. No need for blinds, shades or window painting. Corrulux Flat Panes come in pre-cut sizes to fit most window frames—or can be trimmed with a saw to any special size. They are available in smooth finish or granitized, in structural and heavy structural grades. Easy to install—no special glazing skill is needed. The hard surface of Corrulux resists the effects of most industrial fumes.

For complete details and samples, write to: Johns-Manville, Box 158, Dept. I, New York 16, N.Y. In Canada: Plastic and Allied Building Products, Ltd., Box 250, Dundas, Ont.



The built-in colors of J-M Corrulux Flat Panes make new or old buildings attractive, both inside and outside.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

For more facts circle 624 on Reply Card

Speed maintenance via air... Gardner-Denver air and tools

Waste no time. Put Gardner-Denver air power and tools on your maintenance team. Fast-acting Gardner-Denver air tools help your crew make the most of maintenance hours. Impact wrenches • air hoists • paving breakers • trench diggers • sheeting drivers • backfill tampers • utility drills • grinders • ratchet wrenches • concrete vibrators • nut setters.

Compact Gardner-Denver rotary portable compressors provide a steady, dependable supply of low-cost air. Rugged drawbar makes Gardner-Denver rotaries easy to move. Jackleg provided for quick setting-up. Big toolbox for air hose and tool storage. Write for information.

Gardner-Denver RP85-G (85 cfm) rotary portable air compressor

Gardner-Denver RP125 (125 cfm) rotary portable air compressor

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 196)

can be used to divert control of an air-operated system from one instrument to another, to control a system of valves, dampers or pneumatic electrical equipment, and to change system air supply pressures. For central panel mounting, the switch needs only 2⅜ by 3⅜ in. of space. Its depth is 3¼ in. and it can be flush or surface mounted. Two, three, or four port arrangements can be made on the same body. Eight dial styles and three nomenclature plates are available. Air capacity is 580 cim. Information is in Bulletin 357-2 and Form P-79. The Powers Regulator Co.

40—PIPE WRENCH requires less hand adjusting

In the Rench, the use of hand adjusting for sizes has been minimized because "semi-automation" resets the jaws to accommodate variations in diameters, such as between pipe and

coupling. Key to this simplicity of operation is in the jaw mechanism. While the upper is designed to remain stationary, the lower jaw is installed in a smoothly machined channel in which it is free to "float" to and fro. It is explained that when the tool is applied to a pipe, this floating jaw takes hold under pressure of the handle and increases its bite as pressure is added. Reversely, the jaw lets go instantly at will of operator, so there is no difficulty in removal of tool from pipe. Nye Tool Co.

41—MOTOR CONTROLS for twin pump installations

Type DP Duplex Pump Controls—combination and non-combination—are for control of motors on twin pump installations where two pumps operate individually or in conjunction to provide necessary pumping operation depending on pumping rates required. They provide a disconnect means for every motor, either through use of a disconnect switch, fusible or non-fusible, or a thermal magnetic trip circuit breaker. As a safety feature, combination Type DP Duplex Pump Controls have front operated mechanism mechanically interlocked with enclosure cover, making it nec-

For more facts circle 626 on Reply Card →

A NEW ERA IN RELAY LIFE AND RELIABILITY!

A-B QUALITY

THEY MAY LOOK ALIKE, BUT

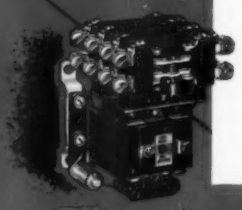
these new relays completely outmode the usual concepts of relay life and reliability.

For years the Allen-Bradley Bulletin 700 Type B and Type BX relays have been preferred for their long life and their consistent, trouble free operation. In having produced millions of these relays, we learned how to improve them. Thus, the new line of Type B and Type BX relays was designed to set a new level of performance standards.

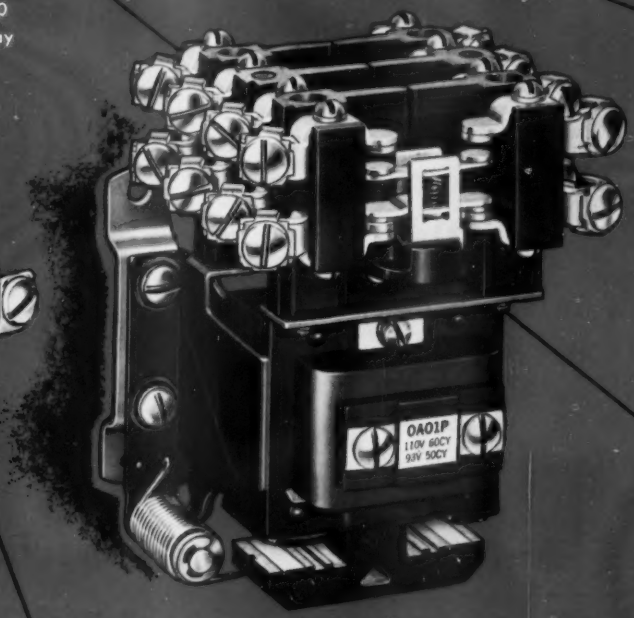
Turn the page and see the outstanding features of these new Bulletin 700 Type B and Type BX relays. For the same price, they offer you even greater value, greater reliability.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

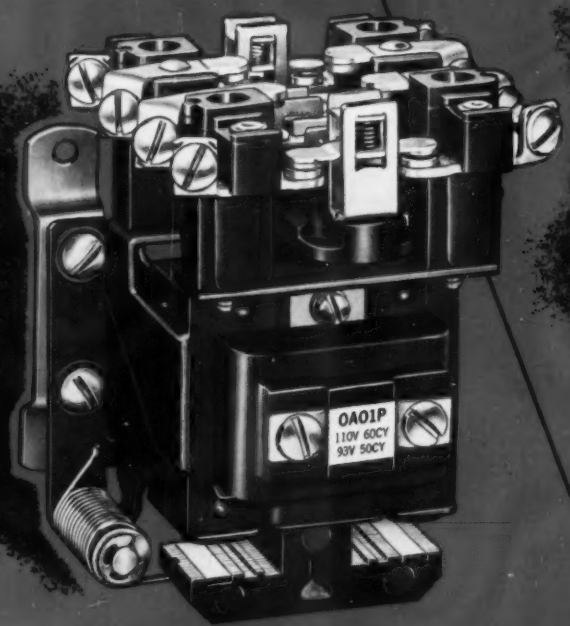
old Bulletin 700
Type B-400 Relay
with 4 N.O. contacts



old Bulletin 700
Type BX-440 Relay



new Bulletin 700, Type BX-440A
AC Control Relay can be wired for normally open or normally closed contacts



new Bulletin 700, Type B-220A
AC Control Relay with 2 N.O. and 2 N.C. contacts

ALLEN-BRADLEY
Member of NEMA
QUALITY MOTOR CONTROL

7-59-MR

NEW BULLETIN 700 RELAYS

TYPE B AND TYPE BX

provide these improved features

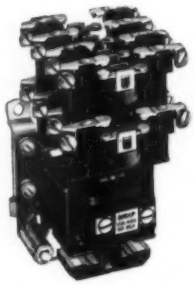
1. New mechanical design gives *at least* 5 times greater operating life.
2. New contact motion provides 10 times greater electrical reliability.
3. Compact construction—new relays are structurally improved with no change in size.
4. Complete interchangeability. Mounting dimensions of new relays have not been changed.
5. Rugged, high efficiency cast plastic coil. New, improved coil fits *all* Bulletin 700 relays.
6. New, stronger, movable contact crossbar—fits Bulletin 700 relays now in service.
7. Improved stationary contact blocks. These new blocks can also be used on present models of the Bulletin 700 relay.
8. Increased life and reliability—*no increase in cost.* These new, improved relays are priced the same as previous Allen-Bradley models.
9. The letter A is added to the Bulletin 700 relay type number merely to distinguish the new line.
10. These new relays are Allen-Bradley's "thank you" to our many customers who have bought millions of Bulletin 700 relays over the years.

A-B QUALITY

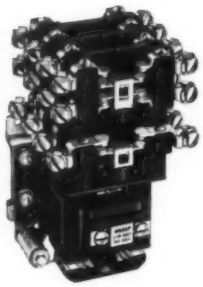
The old Bulletin 700 relay was first placed on the market some 25 years ago. Today, millions of these relays are in daily service—all over the world.

None of the old relay "values" have been lost in the new designs. Instead, these "values" have been greatly improved. The new relays feature a simplified, longer life, solenoid construction. The double break, silver alloy contacts are the same—always in perfect operating condition—without cleaning or filing. The operating coil has been greatly improved—it cannot be damaged by atmospheric conditions, no matter how severe.

No one can deny the popularity of the older Bulletin 700 relays. The new relays—with their superior features—will be an even better answer for any and all relay applications.



TYPE B, GENERAL PURPOSE
Bulletin 700, 8-pole relay. Made with 8 N. O. and no N. C., or up to 4 N. O. and 4 N. C. contacts.



TYPE BX, UNIVERSAL
Bulletin 700, 8-pole relay with both N. O. and N. C. contacts. Changeover is made by reconnecting incoming lines.

HERE IS ANOTHER REMARKABLE ADDITION TO THE ALLEN-BRADLEY RELAY LINE

It's new . . . and it's different. This unusual Bulletin 700 convertible contact relay has contacts that can be changed from normally open to normally closed operation (or vice versa)—in just moments. A screwdriver is all it takes to do the job—no additional parts are needed. Like all A-B relays, it's good for millions of trouble free operations. Watch for announcement and full details of this new convertible relay soon!

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wisconsin
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

7-59-MR

QUALITY MOTOR CONTROL

(Begins on page 196)

essary to disconnect circuit before door can be opened. Non-combination types consist of two Type RA magnetic starters and single Type MR relay for electric alternating mounted in one enclosure. Starter components feature straight-through front wiring and a right angle operating mechanism which allows reduction in size and weight of the control.

All control panels feature undervoltage release. Should power fail on a two-wire control system, the electromagnet is automatically de-energized since there are no holding circuit interlocks. On resumption of power, the electro-magnet is automatically energized without the aid of the operator. This, it is stated, prevents stalling or overheating on low voltage and lets pump panel be left unattended. The Arrow-Hart & Hegeman Electric Co.

42—TAPE MATERIAL for doping the pipe threads

Dri-Seal No. 5 comes in ½-in. tape width with 300 in. of tape in a roll—enough for doping 120 joints of 1-in. pipe. One turn of this material around the thread with a small overlap at

each end gives effective sealing, says manufacturer. Ends are pressed into the threads and the two sections made up. Because Dri-Seal No. 5 is waxy, it lubricates, and its plasticity seals off clearance between threads. Made of Teflon, this material is chemically inert and non-toxic, and resists heat and cold. It is designed to eliminate galling, seizing or rusting of connections, to wed to metal or plastic, yet be removable. Chemtrol.

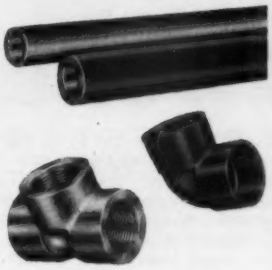
43—PATCHING CEMENTS for use with filter fabrics

Vicel, one of two recently introduced cements, is a solvent type for patching tears and holes in press cloths, centrifuge bags and rotary vacuum filter cloths. This dries by evaporation of the solvent leaving a tough film of

You Can Get Everything
for every kind and type of
INDUSTRIAL PIPING SYSTEM
From *ONE* Dependable Source

MUELLER BRASS CO. *Streamline*
COPPER TUBE AND FITTINGS

Streamline Copper Tube and Solder-Type Fittings make a tight, sanitary system with clean, unobstructed joints that withstand jars and vibrations. Streamline tube and fittings are lightweight, (longer lengths can be conveniently handled, eliminating many fittings); resist corrosive acids, clogging, will not rust. Products available include K, L, M and DWV copper tube as well as both cast and wrought solder-type fittings in a complete range of sizes.



MUELLER BRASS CO. PVC
RIGID PIPE AND FITTINGS

PVC for industrial piping withstands shock, impact, vibration and twisting; can be used at higher pressures than other similar materials. PVC resists corrosive action of water, oil, alkaline or salt solutions, gases and a wide variety of acids. Economical, lightweight, PVC is fabricated in 20' lengths; ½" through 3" sizes.

MUELLER BRASS CO.
VALVES OF ALL TYPES

Streamline valves are ruggedly designed and built to give years of trouble-free service. They are made of non-porous, cast red brass and all working parts are precision machined for perfect alignment of seating surfaces. Positive seating is further assured by tough composition discs. Complete range of sizes and styles includes compression stops, gate, globe and swing check valves, boiler drains and sill cocks.

Write today for complete information on Mueller Brass Co. products for any industrial piping system.

262

MUELLER BRASS CO.
PORT HURON 52, MICHIGAN

For more facts circle 627 on Reply Card

Dreadnaught Casters move loads up to

7½ Tons
PER CASTER

SERIES 1300
¾" thick swivel top plate. Dust-proof self-contained swivel load bearing. Hardened ground and polished raceways. Timken combined radial and thrust bearing. Thick steel horn with reinforced ribs. Special alloy wheel with two Timken bearings.

When it comes to *CASTER STRENGTH* for rolling the big loads along your assembly line, or around your stock pile area, Faultless engineered casters can give a lift to your big production and warehousing problems. Above, a Faultless Series 1300 Swivel Plate Caster and two Faultless wheels in special mountings easily handle a 22,000 lb. Caterpillar Diesel-electric engine with minimum manpower; a usual task for the Faultless Series 1300 Dreadnaught Caster.

Super strong HX300 Casters handle loads up to

5 Tons
PER CASTER WITH 8" WHEEL

SERIES HX-300
1" dia. king pin. Thick steel top plate. Self-contained main load bearing has dust guard and grease seal. Timken radial and thrust bearing. 8" or 10" semi-steel wheels with Timken bearings.

For surplus strength to roll under cargoes that break down or damage ordinary casters, the HX300 Series, extra heavy duty swivel caster, will fit your specifications. It's precisely engineered throughout and constructed of quality materials to provide a caster capable of easily taking on 10,000 lb. loads, while keeping production lines moving with minimum handling costs.

INDUSTRIAL DISTRIBUTORS · THE RIGHT HAND OF PRODUCTION

ASK YOUR DISTRIBUTOR: Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," and the Faultless heading.

Faultless Caster Corporation
Evansville 7, Indiana

Representatives in Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Grand Rapids, Greenville, S.C., High Point, Indianapolis, Los Angeles, New Orleans, New York, Philadelphia, Portland, St. Louis, Washington, D.C., Canada: Stratford, Ontario.

NOELTING Faultless Casters

For more facts circle 628 on Reply Card

NEW PRODUCTS

(Begins on page 196)

acrylonitrile-vinyl chloride copolymer, said to have excellent resistance to concentrated acids and alkalies. It has good adhesion to spun staple synthetic fibers and cotton fabrics, and will not leach out, manufacturer states, permitting use in filtration involving foodstuffs, pharmaceuticals, high purity chemicals.

Nycel, a two-component epoxy cement formulated for strength, fast curing time and resistance to acids, alkalies and solvents, has tensile shear strength of 2000 lb-in, when cured at room temperature, it is announced. Applications include centrifuge bags, press cloths and dust collection bags. Excellent adhesion even to monofilament yarns is reported. Technical Fabricators, Inc.

44—CONNECTORS offer durability and safety

For applications up to 600 v, these Neoprene connectors are announced as crush proof, corrosion proof, water proof and dirt proof. Their molded-to-cable design allows severe or

repeated flexing without breaking the connector-to-cable bond, according to manufacturer. Oval, round and dual round styles are available, from two to 12 poles. Receptacle units fit standard types of outlet boxes. The round series fits standard FS and FD boxes. Joy Mfg. Co.

45—THERMOMETER adjusts ..to any viewing angle

The Princo Multiform can be turned or tilted to the most favorable reading position after stem is in any place, and locked in that position. Its locking device is designed to allow for reset to any desired form should the thermometer have to be moved or repositioned. In this instrument the tube is recessed between a two-piece scale to eliminate parallax, while the red reading mercury tubing is seen against a baked white enamel scale. The case is cast brass or aluminum. The ther-

How to STOP LEAKS

WITH METALSET® A4

You've read a lot about how good epoxy resin is. Metalset makes it easy and economical to use. Just squeeze equal lengths from each tube and mix. Use only what you need. What's left is ready for the next job.

AN EPOXY RESIN CEMENT *IN TUBES!*

Seams and joints in metal ducts, tanks, and containers are quickly and easily filled with Metalset.

Caulking jobs are easy for Metalset. Its lack of shrinkage, and its good adhesion to most metals, assure a tight seal.

Waterproof, corrosion-resistant repairs are made like this: Just clean and dry the pipe—mix Metalset—apply it with a spatula. When it is hard the cement can be machined in any conventional way. The aluminum filler makes this possible.

Advantages of METALSET® A4

METALSET A4 contains no solvent to cause shrinking. Use it in any thickness, one application does the job. It is water and oilproof, chemically stable, adheres strongly to iron, steel, aluminum, glass, ceramics and wood.

Note Well: Metalset A4 is flexibilized the better to withstand thermal and mechanical shock. Only minimum-toxicity materials are used. It sets at room temperature—under mild heat in 15 minutes!

TYPICAL APPLICATIONS:

- Stops leaks in pipes, tanks, concrete
- Bonds most metals, wood, concrete
- Smooths and fills dents in sheet-steel, aluminum
- Sets loose parts tight
- Caulks windows, roof fixtures, sidewalk elevators

SO-432

METALSET®

Made by Smooth-On Manufacturing Company • *Established in 1895* • 572 Communipaw Ave., Jersey City 4, N. J.

For more facts circle 629 on Reply Card

DAY

Pneumatic Conveying & Bulk Storage News

FREE! 2 valuable guides for selecting PNEUMATIC CONVEYING and BULK STORAGE TANKS

BULLETIN M-588—12 page DAY pneumatic conveying guide just off the press. Discusses types of systems, illustrates and diagrams high and low density arrangements, shows equipment and tells "why" and "wherefore" of all types of pneumatic conveying including so-called fluidizing systems.

BULLETIN 574—12 pages, describes horizontal and vertical storage tanks. Points out savings and is filled with photos of various installations plus description of auxiliary equipment.

Whatever your pneumatic conveying or bulk storage problem, look first in these DAY bulletins. They are valuable aids in selecting and ordering the right equipment for your plant. For your free copies use reader service card of this magazine or write direct toDAY.

The DAY Company

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Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 630 on Reply Card

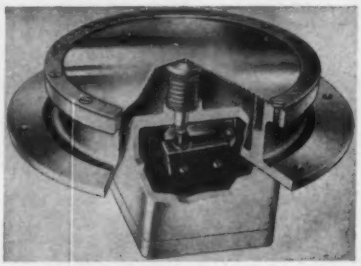
NEW PRODUCTS

(Begins on page 196)

mometer is available with any standard SAMA separable socket or with exposed bulb and perforated stem construction. Precision Thermometer & Instrument Co.

46—BIN LEVEL INDICATOR resists effects of corrosion

Auto-Bin-Dicator is announced as a super-sensitive response mechanism effective for use with light materials without affecting its performance with heavy materials or for general purpose. Both standard and explosion-proof models of this automatic indicator are available. According to manufacturer, it differs from other units



in company's line in that the entire body is heavy aluminum castings and the diaphragm stainless steel, making it corrosion resistant even when installed in a suspended central position in the bin.

The unit can be affixed to thick or thin walled bins, or suspended within the bin at any level through the use of a simple extension. It can also be used in chutes and hoppers to prevent overfeeding. In operation, pressure of material against the stainless steel diaphragm actuates a switch which operates signals, such as lights, bells or horns, and can be set to automatically start or stop the flow of material into or out of the bin and stop or start filling machinery. The Bin-Dicator Co.

47—COMPOUND for floor topping and patching

Formulated of epoxy resins, Top 'N Patch is designed for maintenance, repair and construction of floors, decks, ramps and stair treads. The user adds the desired amount of aggregate, usually sand. A gallon of Top 'N Patch makes 4 gal of ready-to-apply compound. According to company, it adheres to damaged flooring with a tenacious bond and prevents wearing away of the aggregate. Whether used as topping or patching,

material is designed to distribute smashing blows, prevent cracking, and provide resistance to chemical damage. Applied with cement-working tools, the material is ready for light traffic in 4 to 6 hr, heavy traffic in 24 hr, has full strength in 5 days. Fibre Glass-Evercoat Co., Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 279-280.

48—BELT DRESSING in easy-to-use aerosol form

Sprazon can be sprayed on moving transmission belts. To apply this belt dressing, you hold the can 12 to 15 in. from the pulley and spray it on while the drive is running—rotation of the pulley transfers the film of sprazon to the inner surface of the belt. Graton & Knight Co.

49—EAR PROTECTOR for taming the shriek

Quiet-Ear uses neither bulky absorbing materials nor excessively large sealing shells. Applicable wherever

noise is a hindrance or a nuisance, this lightweight and inexpensive ear protector is designed to offer optimum noise protection in diesel engine generator houses, rolling mills, punch press areas and other noisy places. Bausch & Lomb Optical Co.

50—SPUR GEAR HOIST is light, fast, and powerful

The 22-lb CA-10 Model is announced as the lightest of half-ton capacity aluminum spur gear hoists and offering efficient handling for a modest investment. The high-strength aluminum housing is designed to take impact and abuse. The hoist has an 8-ft standard

DAY

DUST CONTROL NEWS

Free! 9 informative dust control equipment bulletins

You can save time when planning and save money when buying if you'll send for these DAY dust control bulletins. Each contains valuable information about dust control equipment and systems. Here's general information plus useful technical data and specifications. Ask for any bulletin which interests you or write for them all – they're free. Use this magazine's reader service card or write direct toDAY.

BULLETIN G-578 — Describes the DAY Type "RJ" filter. An all purpose, versatile unit. Bulletin gives operating features, dimensions and specifications.

BULLETIN 573 — Dual-Clone dust separators — noted for their low resistance and high cleaning efficiency. Easy to install, no maintenance, no moving parts.

BULLETIN 576 — "HV" heavy duty dust separator. Rugged construction and lower initial cost than many light gauge galvanized type cyclones.

BULLETIN F-75 — Reverse Jet Dust Filter Facts. Complete with specifications, typical equipment layouts, capacity and performance tables for DAY type "AC" filter.

BULLETIN N-578 — Gives complete information about Style "A" rotary valves. Construction features, specifications, dimensions and applications.

"SCHLITZ DEFEATS DUST" — FOOD ENGINEERING magazine reprint describes all out dust control for 3½ million bushel Schlitz grain elevator. Request Bulletin "Schlitz Defeats Dust."

"EFFICIENT DUST SNATCHERS" — Bulletin describes DAY's part in providing maximum safety and good housekeeping for starch packing building of large food processor.

BULLETIN 510 — DAY Unit Dust Collectors. Complete, low cost unit designed for plants or applications where central dust control systems are not practical.

BULLETIN I-585 — Industrial Fans. Complete with helpful selection charts, capacity tables, dimensions and specifications. Information on special types and arrangements included.

The **DAY** *Company*

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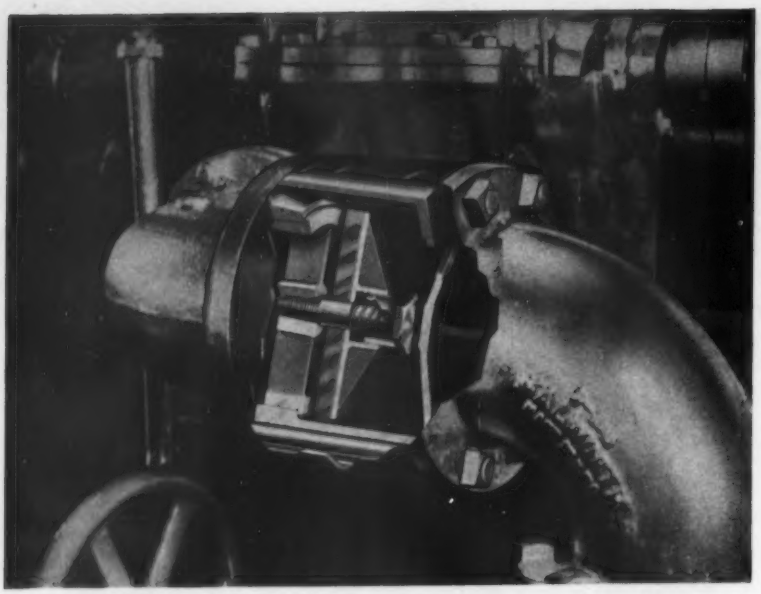
EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 631 on Reply Card



CPV CHECK VALVES ARE SILENT

. . . and this non-slam feature is your *positive* assurance of a silent, safer piping system, with protection to the pump, and other equipment.

Easily installed wherever liquid flows, a CPV Check Valve closes automatically as soon as forward flow stops. The valve is closed before any reverse flow occurs. Dangerous line surges and hammer are eliminated without expensive air cushions, shock absorbers and other devices.

Only CPV CHECK VALVES Give You All These Features

- Straight guided disc with two point bearing assures positive valve seating.
- Helical spring is engineered to close automatically as soon as forward flow stops.
- Ideal for all pressures and temperatures—including high temperature water.
- Available in a wide variety of materials, including Alconite, bronze, steel, stainless steel and monel.
- Easily installed in any position.
- Full radial flow with minimum head loss.
- Approved by Factory Mutual Laboratories for fire lines.
- Choice of four basic types in sizes from ½-in. to 18-in. or more.

Get the full story about CPV Silent, Non-Slam CHECK VALVES. Write today for Catalog C.

STYLE G . . . 2-10"

STYLE GS . . . 6-18"+

STYLE HU . . . ½-2"

STYLE H . . . ½-2"

COMBINATION PUMP VALVE CO.
851 PRESTON STREET • PHILADELPHIA 4, PA.
SOLD BY RELIABLE AGENTS IN PRINCIPAL CITIES

For more facts circle 632 on Reply Card

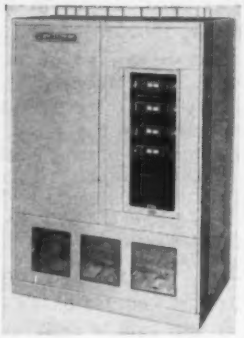
NEW PRODUCTS

(Begins on page 196)

lift, balanced gearing mechanism, automatic Weston-type load brake. Manufacturer's TG-10-P Model Trolley is recommended for use with this compact, low headroom hoist. Bulletin ADH-80 gives details. Coffing Hoist Div., Duff-Norton Co.

51—UNIT SUBSTATION is compactly designed

This low-voltage Power Zone, a package unit substation for use on 480-v systems to supply 120/208Y circuits, is designed for lighting, and similar



loads. It contains three-phase transformers from 75 kva to 300 kva and offers up to 72 in. of panel space for molded case circuit breakers. The compact unit (60 in. long, 36 in. deep and 79½ in. high) goes through doorways, and, where space is critical, may be installed against a wall. Sound levels have been reduced to 45 db for sizes to 150 kva, 52 db for 225 kva, and 56 db for 300 kva. Square D Co.

52—EMERY-EPOXY provides non-slip surfacing

Seeded Emeri-Epox is a modification of Emeri-Epox, a fast-setting flooring material introduced earlier this year. The modified form is said to bond well to concrete, asphalt, wood, tile, stone, brick and metal surfaces and offer superior resistance to chemical attack and mechanical abuse. Manufacturer says it is flexible, shrinkproof and waterproof and won't freeze in storage. Essential difference is in packaging. Seeded Emeri-Epox combines the same components, but in separate packages, so that the liquid plastic may be applied first and the aggregate seeded in afterward.

It is explained that Emeri-Epox, in its original form, provides a surface sufficiently abrasive for ordinary purposes, but this property is increased

New Nalco Coagulant makes Larger, Heavier Floc . . . Faster

Radically different Nalcolyte 110 used with Conventional Chemicals to Cut Costs, Speed Action in Water Clarification

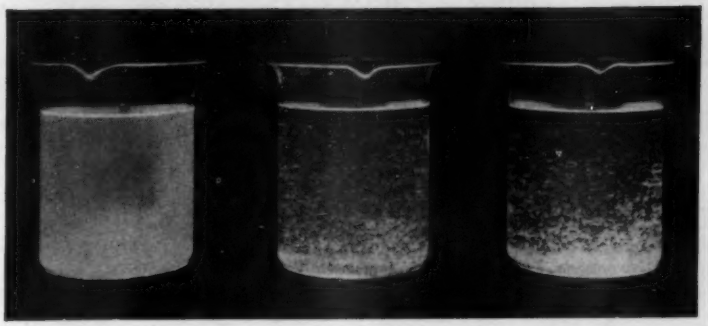


Photo taken in Nalco Laboratories 7 seconds after agitation stopped: *Left*, Control sample of untreated turbid water; *center*, same water, treated with 50 ppm alum; *right*, same water, treated with 20 ppm alum, 1 ppm Nalcolyte 110. Note that large, dense floc is settling out much more rapidly than center alum-treated sample.

Nalcolyte 110 is a new, non-ionic high polymer flocculant of very high molecular weight—over 1,000,000. It is used in extremely small dosages with conventional coagulants (such as sodium aluminate, alum, ferric sulfate) to increase size, density and uniformity of floc.

Less Chemical; Greater Capacity

Action of Nalcolyte 110 in creating heavier, larger, faster-settling floc not only permits greater throughput rates without floc carryover to processing equipment, but also cuts the total chemical requirements at a resultant cost saving.

In the example illustrated above, only 40% as much alum is required when Nalcolyte 110 is used.

May be Used in Potable Waters

Approved by the U. S. Public Health Service Technical Advisory Committee for use in treatment of public water supplies, Nalcolyte 110 gives water works the opportunity to get appreciably greater capacity from existing clarification equipment—at lower treating cost.

High Suspended Solids No Problem

Waters containing high suspended solids respond quickly to Nalcolyte 110 coagulating action . . . frequently without other coagulant chemicals.

Typical high suspended solids waters which can be treated with speed and economy with Nalcolyte 110 are paper mill white water systems, industrial waste waters, mineral slurries and blast furnace gas wash water slurries.

Nalcolyte 110 Easy to Handle

Nalcolyte 110 is a coarse, white, free-flowing powder of non-toxic character. It is fed in dilute water solutions with standard liquid proportioning pumps or feeders. Stock solutions are prepared at concentrations up to 20%. Packaging is in convenient 25-lb. bags.

Data Available Promptly

Full information on Nalcolyte 110 for your coagulant use is ready to be sent upon your request. Write today, or call your Nalco Representative.

National Aluminate Corporation is now

NALCO CHEMICAL COMPANY

6216 West 66th Place • Chicago 38, Illinois

Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada—Alchem Limited, Burlington, Ontario

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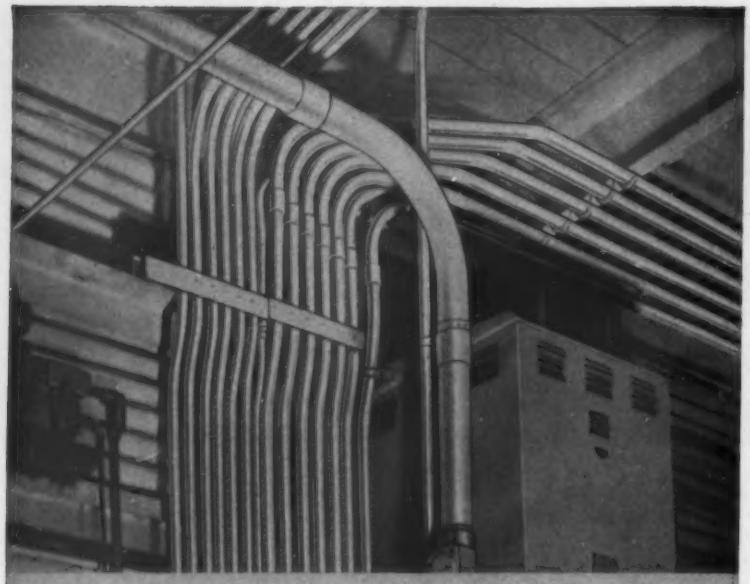
Nalco CHEMICALS

For more facts circle 633 on Reply Card



REYNOLDS ALUMINUM
Electrical Rigid Conduit
cuts installation and maintenance costs!

Reynolds Aluminum Electrical Rigid Conduit offers *five* important benefits: **1. LIGHTWEIGHT.** Aluminum conduit weighs approximately two-thirds less than steel conduit. Installation is faster, easier. **2. CORROSION-RESISTANT.** Aluminum cannot rust—ever—and is corrosion resistant to water, weather and most industrial atmospheres. There are no periodic protective maintenance problems, no rust on walls or surrounding fixtures. No rusting threads. **3. NON-MAGNETIC.** With aluminum conduit, voltage drop is reduced. Longer conduit runs or smaller conductors are possible. **4. EASY-WORKING.** Aluminum conduit bends and forms quickly and accurately to meet and by-pass obstacles found in many installations. **5. NON-SPARKING.** Aluminum will not spark from accidental contact with hard objects. Perfect for use in inflammable areas and atmospheres.

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

For more information and names of Reynolds Aluminum Electrical Rigid Conduit outlets, call your nearby Reynolds Sales Office or write *Reynolds Metals Company, Box 2346-EQ, Richmond 18, Virginia.*

Also write for descriptive brochure.

Watch Reynolds TV shows—"ALL-STAR GOLF" and "ADVENTURES IN PARADISE"—ABC-TV

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 196)

when the seeding technique is used, because the abrasive emery may be concentrated at the surface. Traction may be varied by method of seeding and by choice of two grades—a coarse aggregate for outdoor applications, and a fine one for indoor use. In application, equal parts of the two components, epoxy resin and catalyst, are blended and swabbed into place. Then the aggregate is seeded into the liquid film. Walter Maguire Co., Inc.

53—FAULT LOCATOR is streamlined, 9 lb lighter

One-third lighter in weight, the redesigned Brunt Faultfinder now includes, as standard, double ear phones covered with foam rubber. Previously offered only as optional equipment, the

ear phones provide increased comfort and a louder, clearer signal. The weight reduction, from 27 to 18 lb, has been accomplished through use of new, lighter materials. The Brunt Faultfinder, a combination ground detector and fault locator, is designed to locate accidental ground on power systems, both a-c and d-c, up to 600 v, while the system is energized. It imposes only 2 amp on the circuit, manufacturer points out, and can not damage equipment on the line. Parr Mfg. Corp.

54—BOX TRUCK is lightweight and tough

Announced as practically indestructible, this lightweight box truck is made of chrome impregnated fiber glass. It is designed for textile industries, plants and mills, meat packing and food processing plants and others. Truck comes in two standard sizes; the smaller measures 21½ by 39¼ by 31 in. high, overall and weighs 50 lb. A larger size weighs 68 lb. The truck is claimed impervious to steam, water, oil, mild acids and alkalies, to with-

Now's the time to prevent freezing of heater coils... with Production Planned steam trapping

By John W. Ritter, Test Engineer, SARCO Company, Inc.

Freezing of heating coils usually takes place when outside air temperature is slightly below the freezing point, and it is most common in coils that have the steam supply controlled by a temperature regulator which keeps the outlet air temperature constant. Freezing can occur only when the coil becomes water-logged, and in this case the steam trap is often blamed for the trouble.

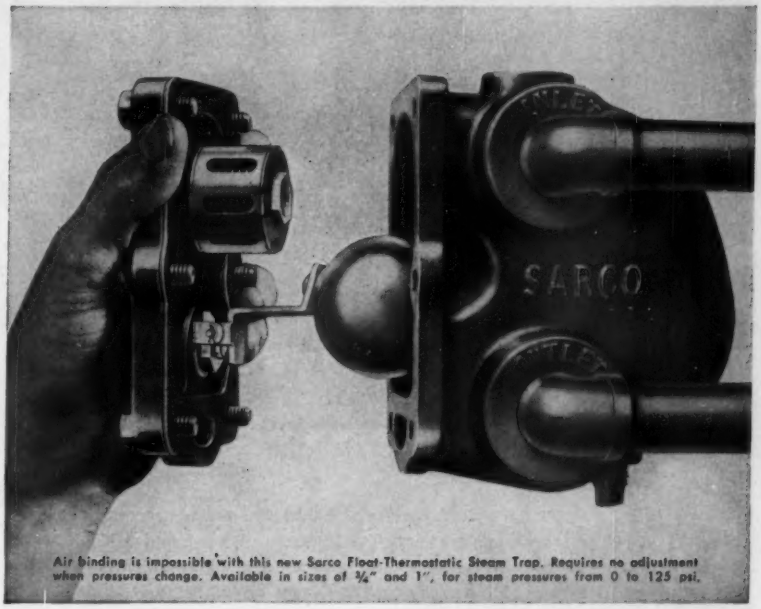
The discharge capacity of any steam trap depends upon the difference in pressure between the trap inlet and its outlet. If there is no pressure difference, the trap cannot remove condensate; and if inlet pressure is lower than outlet pressure, condensate will be held back in the coil.

There are three ways to avoid this difficulty. First, a pressure controlled bypass can be arranged around the temperature control valve to prevent heater pressure from falling below a preset minimum. This plan would make the temperature controller ineffective over part of the range of outside air temperature.

A better solution is to install the steam trap well below the unit, and thus provide a hydraulic leg to enable the trap to discharge even with a vacuum in the steam space. An ample sized vacuum breaker should be installed at the top of the steam inlet of the heater.

To compute the hydraulic head needed, use a figure of 3′ per 1 psi pressure differential. For example, if the trap has the required capacity at 1 psi differential, the minimum head will be 3′.

Thirdly, on new construction, the preheater can be divided into two sections. The first should be capable of raising the air to at least 32° under minimum outside air conditions. The second section should raise the air from 32° to the final temperature. Full steam is supplied to the first coil at all times, while the second is controlled to maintain the final temperature needed. The first coil will not freeze because of the maintained pressure, nor will the second, because minimum air temperature is always above 32°.



Air binding is impossible with this new Sarco Float-Thermostatic Steam Trap. Requires no adjustment when pressures change. Available in sizes of ¾" and 1", for steam pressures from 0 to 125 psi.

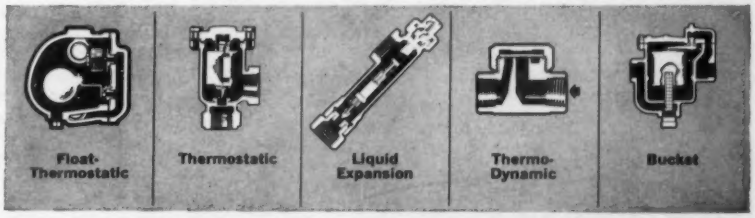
A SARCO F-T Steam Trap will drain condensate completely

Count on the Sarco Float-Thermostatic Steam Trap to discharge condensate practically at steam temperature, continuously and without shock. Sarco F-T's do not cause pressure fluctuation while discharging.

For *production planned* trapping of heating coils, with accurate temperature control, use the new Sarco Steam Trap Type F-T.

Write for Technical Bulletin T502 on prevention of freezing in heater coils. You'll also receive a bulletin on Sarco F-T Steam Traps.

Remember that Sarco can give you *impartial* advice on steam trapping because only Sarco makes all 5 types. 5968-B



SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:
Thermostatic • Liquid Expansion • Float Thermostatic
Thermo-Dynamic • Bucket

For more facts circle 635 on Reply Card

Around-the-clock operations at the Champion Paper and Fibre Company's sprawling Pasadena, Texas, plant called for illumination of a million square feet of wood storage area. And just thirty-two 1,000-watt Wide-Lite area lights were required to provide the answer – uniform coverage without distracting glare or dangerous dark areas.

Designed especially to enhance the unique characteristics of color-corrected mercury vapor lamps, Wide-Lites bring *new dimension* to area lighting. They produce broad patterns which provide smooth, even coverage without hot spots or dark shadows. The patterns may be accurately plotted to determine the exact number of units needed to provide any desired level of illumination.

Ruggedly constructed from cast aluminum alloy, Wide-Lites are finished in aluminum epoxy paint for corrosion control. Outdoor models are sealed with tempered glass lens, and re-lamping is accomplished without disturbing the seal of the lens. Exclusive built-in heat radiating fins limit lamp temperatures to the most efficient range. A choice of reflectors is available on all models, and sizes range from 100 watt to 1000 watt.

To assist you in planning efficient working coverage of outdoor working areas, Wide-Lite engineers have prepared a unique group of transparent plotting curves. Write today for your set!

WIDE-LITE

manufactured by
WIDE-LITE CORPORATION
P. O. Box 191 • Houston 1, Texas

In Canada: Wide-Lite Division of Wakefield Lighted Limited London, Canada

OUTDOOR AREA LIGHTS • INDOOR LUMINAIRES • SPORTS LIGHTS • PROTECTIVE LIGHTS

For more facts circle 636 on Reply Card

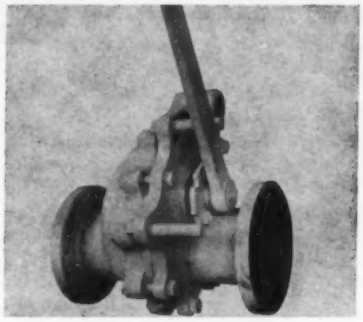
NEW PRODUCTS

(Begins on page 196)

stand temperatures from –40 to 212F (short exposures to 250 F). Two full length steel channel members give firm caster attachment and reinforcement against shock loads. Box has smooth inside surface with rounded corners for easy cleaning. Two casters in the center and one double ball race swivel caster at each end, are arranged tilt style for 360-deg directional travel. Nutting Truck and Caster Co.

55—GATE VALVE minimizes clogging problems

Designed to greatly minimize the problem of slurry material clogging the interior of a valve body, this gate valve has wide application in the petroleum, chemical, sugar refining and allied industries. Features include



unique shape of interior, and sloping sides of valve disc which causes slurry material to be recirculated in body chamber when valve is being opened or closed. This action prevents material from packing up, it is noted, and there are no internal stops within valve body which could interfere with free flow of material. If material does accumulate or pack up, purge holes are provided to introduce air, steam, or water under pressure into body chamber. Valve is offered in 4-in. size with iron body, lever-operated. It can be had in iron, steel, brass or stainless steel. Everlasting Valve Co.

56—CURING AGENT SEAL for concrete floors

With Tremcrete, a combination curing agent and seal for new concrete floors, wetting down of concrete, and use of straw, burlap or paper are claimed unnecessary. Applied to new concrete floors 10 to 12 hr after final troweling, it dries to tack free stage in 2 to 3 hr. Tremcrete provides a high degree of water retention in concrete while cure takes place, manufacturer

MOYNO®
PUMPS

Let MOYNO'S® "Progressing Cavities" Cut your Pump Maintenance Costs!

MOYNO's unique *"progressing cavity"* principle cuts pump maintenance costs because material being moved contacts only one moving element. MOYNOS are constructed to stoutly resist corrosion and abrasion. As shown in the cutaway model above, MOYNO's screw-like rotor revolves in a double-threaded stator forming *"progressing cavities"* that move material smoothly along, without foaming, aerating or crushing. Even where duty is so torturous that rotor and stator must be made of special resistant materials, MOYNO parts show little wear.

In industry everywhere, and on OEM applications, MOYNOS are proving "if it can be pushed through a pipe . . . MOYNO will pump it!" Typical materials pumped include non-pourable pastes, abrasive slurries, chemicals, foods, acids, even suspended solids up to one inch in size. Many materials now successfully pumped by MOYNO were once considered "unpumpable" . . . had run up prohibitive maintenance costs on other type pumps or ruined them completely.

Capacities are available up to 500 gpm and pressures up to 1000 psi. Off-the-shelf replacement parts are always immediately available. No doubt your plant flowsheet or OEM product has a spot where MOYNOS can cut costs drastically. To find out how, write today for Bulletin 30-PE!

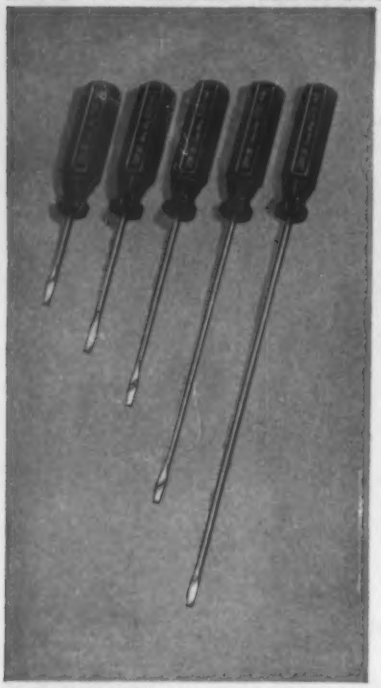
ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps

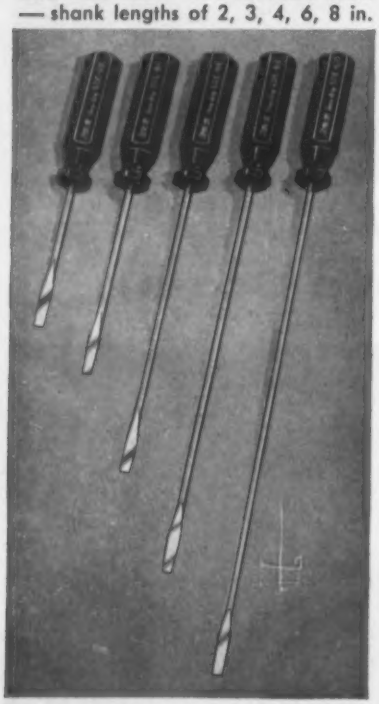
SPRINGFIELD, OHIO · BRANTFORD, ONTARIO

For more facts circle 637 on Reply Card

New thin-blade screwdrivers by Snap-on speed small screw turning



SDE 450 SET — 1/8-in. blade width — shank lengths of 2, 3, 4, 6, 8 in.



SDE 650 SET—3/16-in. blade width — shank lengths of 3, 4, 6, 8, 10 in.

ELECTRICAL

ELECTRONIC

AIRCRAFT

AUTOMOTIVE

COMMUNICATIONS

ANY INTRICATE WORK

Here are real timesaving tools for electrical and electronic assembly and maintenance, or any other limited space work.

Thin driver blade tip is the same width as the shank diameter, to follow screw below surface or work among intricate assemblies. Blades are made from extra-tough alloy steel for long life. Tips are precision-machined to seat properly in screw slots to prevent slippage and damage.

Crimped shanks anchor firmly to prevent turning in handles. Two blade widths — 1/8 in. and 3/16 in. Blade lengths of from 2 in. to 10 in. Available individually or in sets of five.

Insulated handles are shockproof and practically unbreakable. "Octo-Grip" handle shape prevents tool from rolling and provides for a powerful turning grip without hurting the hand.

Put new speed in those limited space jobs with these new *Snap-on*, thin-blade screwdrivers. They'll pay for themselves in short order. Write us or call your nearest *Snap-on* branch.

SNAP-ON TOOLS
CORPORATION
8068-I 28th Avenue • Kenosha, Wisconsin

For more facts circle 638 on Reply Card

NEW PRODUCTS

(Begins on page 196)

states, it gives abrasion resistance while building is being completed; and resists dusting, solvents and alkalis. The Tremco Mfg. Co.

57—REVOLUTION COUNTER is totally enclosed

This small, seven-digit, non-reset, add-subtract revolution counter is totally enclosed in die cast case with window. It is available sealed for outdoor use,

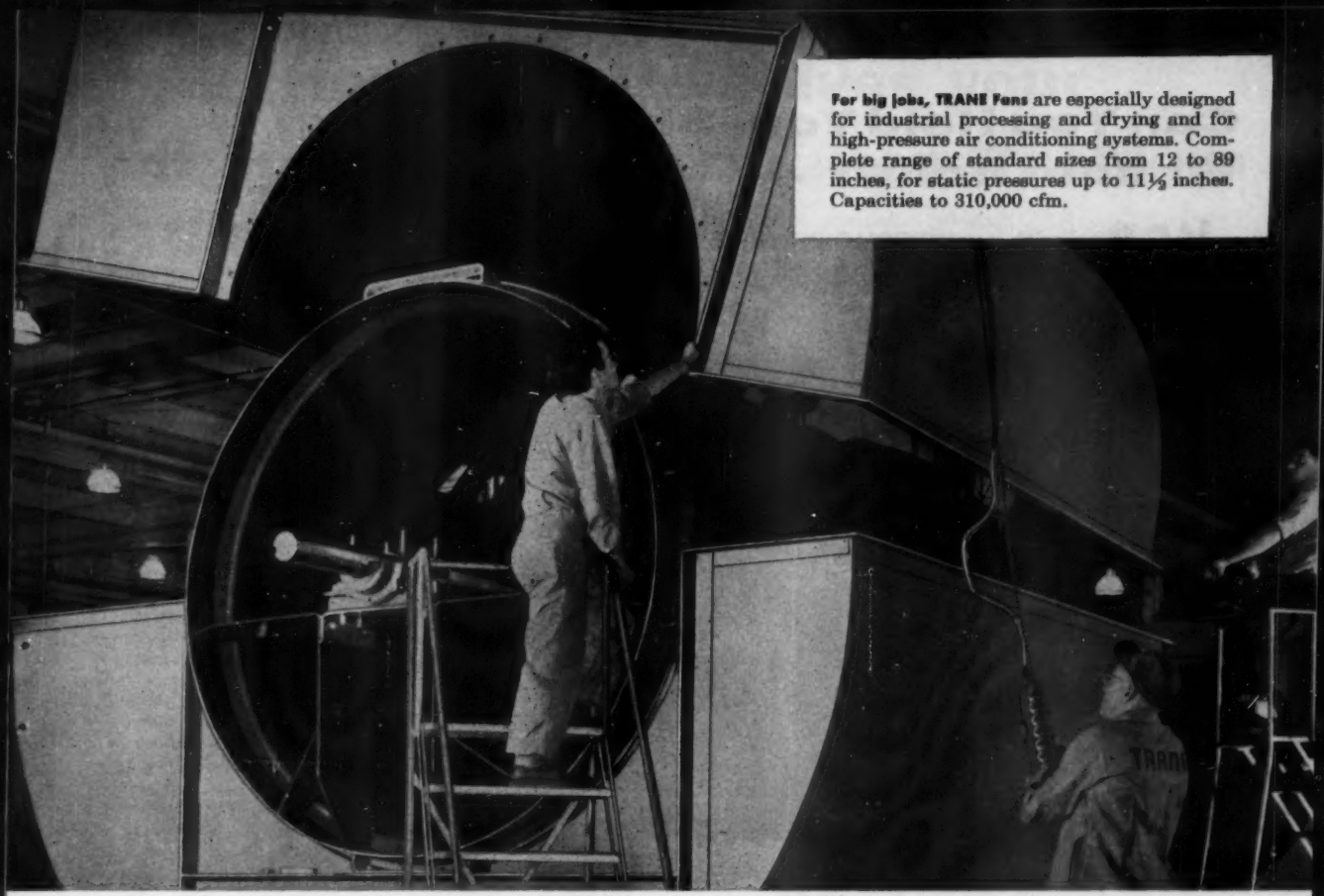
or unsealed. It may also be had with adaptor for flexible shaft drive where flexibility in positioning counter is required. It adds 10 counts per forward shaft revolution; subtracts same ratio per reverse revolution. Speeds range to 10,000 cpm. It is available with top-coming or top-going shaft revolution; right or left shaft extension. It is 2 1/32 in. long. PIC Automation Controls Div., General Controls Co.

58—SPRAYING SYSTEM is simple, highly versatile

For spray operations where elimination of overspray is the primary object, the HydraAirless 20 is designed to enable spraying in open areas without a spray booth. No atomizing air or heat is required and with overspray virtually eliminated, material savings are reported to average 40 per cent. A feature is ease of conversion from standard unheated airless spraying to full temperature and viscosity control, accomplished by quick attachment of Spee-Flo heater and recirculating assembly to basic unit. The Spee-Flo Co.

59—LIGHTING FIXTURE has plastic shield

Garlite 101 has a two-tone plastic Dualens shield, extruded in one piece, with sides in diffuse white and a patterned crystal clear bottom. This design is claimed to cut down brightness while allowing highly efficient down lighting. The shield may also be lowered from either side, and it hangs securely on a continuous hinge. Gar-



For big jobs, TRANE Fans are especially designed for industrial processing and drying and for high-pressure air conditioning systems. Complete range of standard sizes from 12 to 89 inches, for static pressures up to 11½ inches. Capacities to 310,000 cfm.

Choose a dependable Trane Fan for any process or comfort job!

Accurate ratings, rugged construction assure quiet, efficient operation

The fans you choose for your air-moving jobs—process or ventilation—may mean the difference between top performance and inadequate performance. That's why leading consulting engineers turn to TRANE for fans that are designed for quiet, efficient operation . . . simplified installation and maintenance—and available in a complete range of capacities and types to handle any job.

TRANE Fans are *accurately rated* and ruggedly built. Solid workmanship and the most modern tooling assure consistently dependable performance. And each TRANE Fan design has been tested and approved in the industry's most modern and complete testing laboratories.

TRANE gives you a single, reliable source for *all* your air moving jobs: giant Class I, II and III fans . . . Cabinet Fans . . . Utility Fans—all tested under the AMCA and ASHAE Code. TRANE field personnel in 97 offices are available to help you make the best selection for any air moving job.

When you need a rugged, dependable fan for human comfort or industrial process, turn to TRANE. See your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.

WANT MORE FACTS? Write on your letterhead for Bulletins: FC Fans, Class I and II (DS-348-F); BI Fans, Class I and II (DS-348-B); BI Fans, Class III (DS-348-C); Utility Fans, (DS-348-U). Cabinet Fans, (DS-348-D). Axial Roof Ventilators, (DS-364-A). Centrifugal Roof Ventilator, (DS-364-C).

For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

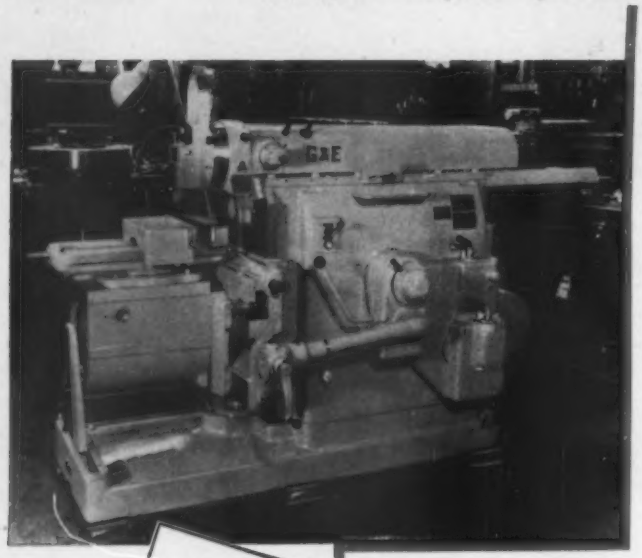
THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. • CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED, TORONTO • 87 U.S. AND 19 CANADIAN OFFICES

FOR ROOF APPLICATIONS new TRANE axial flow and centrifugal roof ventilators are especially designed for low silhouette, efficient air movement. Complete range of sizes and models.

PACKAGED UTILITY FANS for fast, economical installation for hundreds of plant ventilating jobs. Exceptionally smooth and quiet in operation. Capacities to 15,450 cfm.

Can You Hold Your Shaper Without Bolts?

YES- with new WEDGMOUNT which anchors Shapers, Presses, etc. *and* permits precision leveling!



Free folder gives complete facts about **WEDGMOUNT** with—

- "Air-Loc" patented vinyl, sisal and cork pads top and bottom grip machines to floors
- double-wedge construction which permits immediate precision leveling
- keyed construction which prevents movement within the mount
- sizes available thru distributors, and prices

This Gould & Eberhardt 24" Industrial Universal Shaper, operating at 120 cuts per minute with a 4" stroke, is installed without bolts on a new type machinery mount called WEDGMOUNT. A dial indicator at the base of the shaper showed a total oscillation of only .022" during operation, and no "walking." The 7,800 lb. machine is installed on six WEDGMOUNTS, each type 3" x 6" S. Before operation, precision leveling is achieved by simple adjustment of a bolt within each mount. Top and bottom of each mount is surfaced with patented "Air-Loc" pads, which provide the high degree of friction required to hold the machine in place despite its strong lateral thrust.

Air-Loc® WEDGMOUNT

write to... **Clark-Cutler-McDermott Co.**

115 West Central Street • Franklin • Massachusetts

For more facts circle 640 on Reply Card

NEW PRODUCTS

(Begins on page 196)

lite 101 may be installed either in a continuous run or individually. It is available in one, two and four-lamp models. Bulletin 59 gives details. Garden City Plating and Mfg. Co.

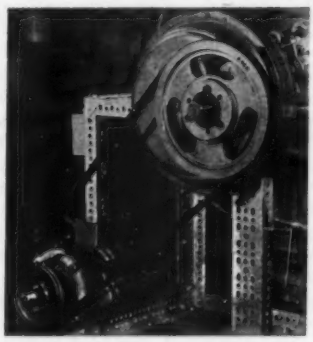
Reader Service Cards on pages 279-280 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

60—PAINT ADDITIVE provides non-skid finish

Cat Grip is a non-skid compound which may be added to paint, lacquer, enamel or varnish. It is claimed to provide a non-skid, high friction additive base which will not change the color of the paint itself. Uses for it include docking platforms, scaffolds, cement floors. Solfo Paint Mfg. Co

61—V-BELT DRIVE transmits more power for its size

Compact drives in the American 3-5-8 line utilize improved V-belts with cross sectional areas reduced nearly 50 per cent without loss in life expectancy, according to manufacturer. Up to three times as much power can



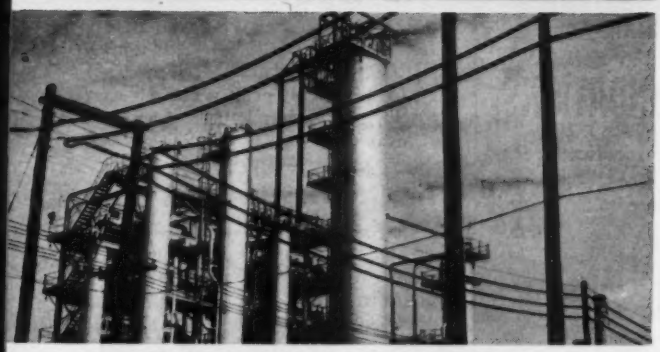
be transmitted in the same area; or fewer belts, narrower sheaves and smaller center distances can be used to transmit the same amount of power. The three belt cross section sizes replace five sizes required with previous V-belt drives. Each belt cross section has been fitted to a particular horsepower range: 3-V belts (⅜-in. top width) handle drives from 1 to 50 hp; 5-V belts (⅝-in. top width) handle drives up to 200 hp;

How Okonite solves your High-Voltage Distribution Problem

Reliable primary distribution is a must for efficient, economical operation. As the use of higher voltages increases, the problems of keeping primary distribution reliable increase too. But, whatever your specific need, Okonite has designed a construction that will do the job . . . like those shown here.

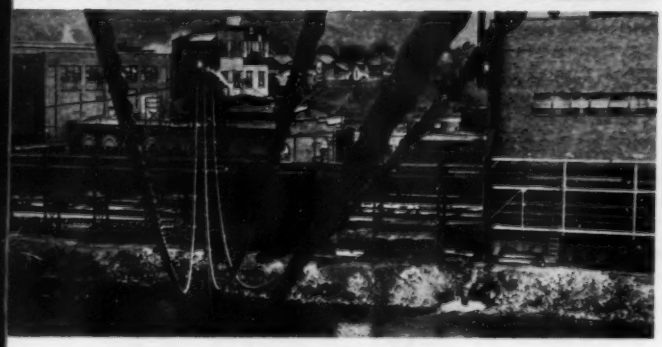
OKOLITE-INSULATED

This Okolite-insulated 25kv submarine power cable, installed by Bonneville Power Administration under Puget Sound, was 7½ miles long, weighed ¾ million lbs. It is typical of the many Okolite-insulated cables designed to solve specific high voltage power problems. Other constructions for underground, aerial, duct or interior installation are frequently protected by an Okoprene (neoprene) sheath, compounded to Okonite's own formula for high weather, temperature and abrasion resistance. Okolite oil-base insulation has demonstrated in more than 30 years of service its high dielectric strength, moisture-resistance and stability in all types of installation conditions. All Okolite-insulated cables must withstand self-imposed a-c and d-c voltage tests that are highest in the industry.



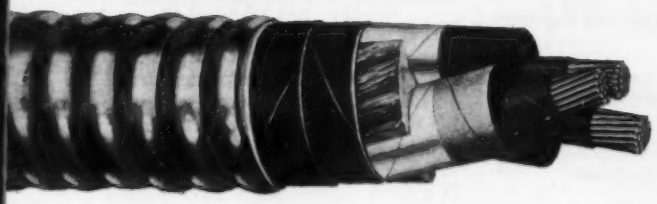
OKONEX-OKOPRENE

This Okonex-Okoprene 15kv primary distribution system was installed to save space, eliminate safety problems and provide improved voltage regulation at Magnolia Petroleum's 1500-acre refinery near Beaumont, Texas. Okonex (butyl-base) cables are highly resistant to heat, and are often specified to give additional protection in high ambient parts of the plant or to provide additional ampacity in circuits. The Okoprene sheath provides excellent protection against moisture and corrosion as in Magnolia Petroleum's refinery where there was a high moisture-saline content in the air plus chemical atmospheres at many of the processing units.



SELF-SUPPORTING CABLE

These four 7500-volt Okolite-Okoprene self-supporting aerial cables span 395 feet to distribute power to a section of a Southern paper mill. Easy to install in one simple operation, Okolite-Okoprene self-supporting aerial cable reduces clearance space requirements, is neat-appearing, often may be installed on existing buildings or supports, offers greater safety to personnel and eliminates insulator flashover due to contamination. Okonite's patented Dualay assembly can be tapped hot at any point in non-shielded types.



LOXARMOR

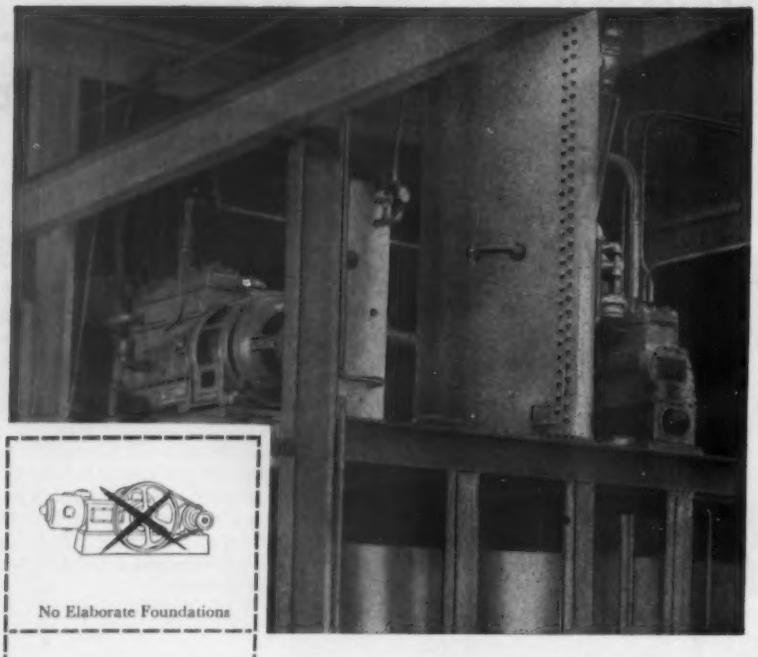
And on any high-voltage construction, a Loxarmor covering offers economy and flexibility in a cable system where the complete protection of a rigid conduit system is not required. Excellent mechanical protection is provided by a Loxarmor interlocking "S" tape available in galvanized steel, aluminum, bronze or copper. Loxarmor saves money in installation and initial purchase costs, makes it easy to add or re-route circuits and requires less space than conduit to handle the same number of circuits.

One of these high-voltage cable constructions will fill your requirements. Write for Bulletin ea-1117, "How to Choose Insulated Cable," to The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, New Jersey.

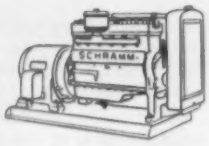
where there's electrical power . . . there's **OKONITE CABLE**

7090

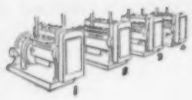
For more facts circle 641 on Reply Card



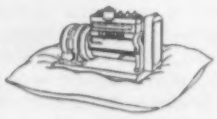
No Elaborate Foundations



Compact

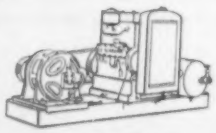


Unit System



No Vibration

Easy to Move



Complete Package

NO ELABORATE FOUNDATIONS

Schramm Compressors are vibration-free!

Any floor space will serve as a base for Schramm Compressors. There's no need of special foundations; in fact, Schramm Compressors don't even have to be fastened to the floor. Balanced reciprocating parts assure vibrationless operation, longer life. And vibration-free Schramm Compressors are easier on your building. Direct drive or V-belt driven to suit your exact needs.

Compact—Schramm Compressors take less space, can be located anywhere. Take advantage of unused corners.

Unit System—No need for costly centrally located compressors and long air lines. Use only the compressors you need—add to them as requirements grow.

No Vibration—Balanced reciprocating parts provide smooth operation, lengthen compressor life.

Easy to Move—Change the location of your compressor to suit your needs. Shorten your air lines. Meet changes in production plans.

Complete Package—All you need for your air requirements in a single package.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 642 on Reply Card

NEW PRODUCTS

(Begins on page 196)

and 8-V belts (1-in. top width) transmit up to 1500 hp. Compact sheaves have quick-disconnect split bushings tapered to mate with the taper of the sheave hub, a design permitting rim speeds as high as 6000 fpm. The American Pulley Co.

62—COPPER BRIGHTENER cleans by simple dip process

Copperbrite 48 is announced as a non-deteriorating copper brightener which produces bright, chemically clean surfaces for printed circuits, bus bars, copper parts, etc., yet contains no strong etching acids. It is claimed to have an indefinite bath life because it is not contaminated by copper accumulation due to etching. The brightener is usually diluted 1/3 to ½ with water and may be used cold or hot (160-180 F). Additions due to dragout are all that is necessary to keep it at peak performance strength, says manufacturer. London Chemical Co., Inc.

63—SILICON CHARGERS for the 12-v truck batteries

Two new models of the compact, plug-in AutoReg Silicon Chargers are designed to charge six-cell, 12-v truck batteries in just 8 hr. Model AR1-8 charges batteries up to 300 amp-hr capacity; Model AR2-8, those up to 450 amp-hr capacity. Heavy-duty, three-phase industrial

wiring is not required; these chargers plug into a standard 15-amp, 115-v single-phase, 60-cycle convenience outlet. Charging involves simply turning the timer to 8 hr, or to 11 hr for equalizing, as desired, and the rest is automatic, says manufacturer—the charger is automatically disconnected from the a-c line once the cycle is completed. The charger employs a hermetically sealed silicon rectifying element, it is pointed out, and because this is not subject to aging characteristics of conventional rectifiers, no ad-

For more facts circle 643 on Reply Card ——→

ALUMALURE . . . at this price no building need be drab

Economy is no longer a reason to shun color for your buildings. Alumalure* comes in 11 exciting shades at a surprising 15 cents per square foot over plain aluminum. Nor do savings end with initial cost. The solid aluminum base metal defies corrosion, and the tough baked alkyd finish has already passed the 15-year mark in a rigorous test of durability.

Alumalure installs more easily than other materials, too, because it comes in longer and wider sheets. You have more colors to choose from, with a meticulous match from panel to panel.

Now write . . .

for the next best thing to an actual sample—our new color-swatch folder that shows exact shades plus data on sizes and finishes. Or, if you want to see the real thing, your local Alcoa salesman will bring over his full line of Alumalure samples today. Call him, or if you prefer, write on your company letterhead for the folder: Aluminum Company of America, 2066-J Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

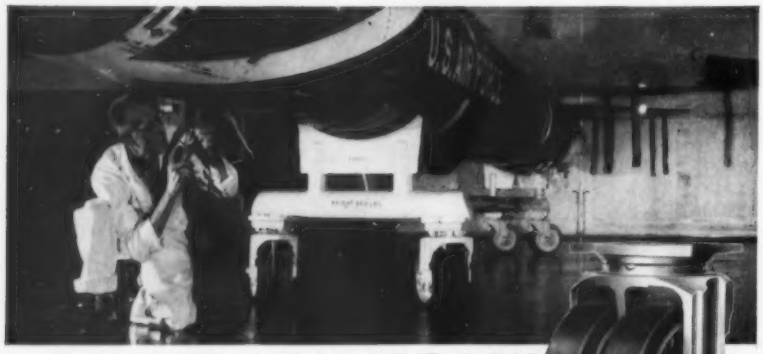
Specify Alumalure!

**Trademark of Aluminum Company of America*

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS



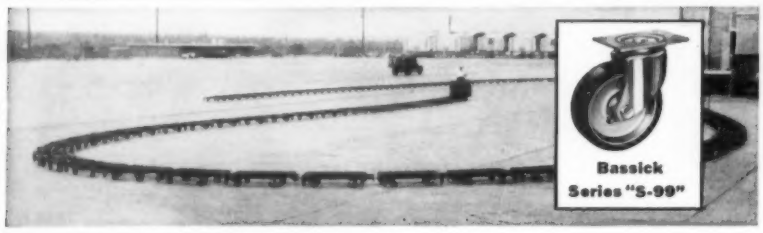
Bassick heavy-duty double-wheel caster with "Floating Hub."

Rolling Ground Support For Air Force BOMARC

The U. S. Air Force "Bomarc" interceptor guided missile made by Boeing Airplane Company, Seattle, Washington, will fly far and fast to guard the U. S. from attack by enemy aircraft.

But in base assembly areas and maintenance shops, as shown here, Bomarc rolls on heavy-duty Bassick double-wheel "Floating Hub" casters. Double wheels give high load capacity and resistance to tipping. The unique Bassick "Floating Hub" absorbs shocks, damps vibration, and eliminates shimmy and bouncing.

Bassick's "Floating Hubs" are the only spring-mounted casters that can effectively absorb horizontal impacts. "Floating Hub" casters are available in a complete line, from light-duty single-wheel types to the heavy-duty type shown here. They're ideal for power-pulled applications, and they keep on rolling under conditions that ruin ordinary casters.



New Rubber-Tired Steel-Side-Plate Wheels

Bassick casters are available with bolted-steel-disc wheels with demountable tires in 3½-, 4-, 5-, 6-, and 8-inch sizes. They're recommended for any institutional or industrial application within the load capacity of the tire.

Look at these big features: • *Floor protection*—highest quality rubber tires • *Replaceable tires* • *Strong, easy rolling*—permanently adjusted bearings • *Neoprene or conductive tires*—available when specified.

Unique "Dolly Train" Rolls On Bassick Casters

At Convair Division, General Dynamics Corporation, Fort Worth, Texas, this power-pulled, 160-dolly train features Bassick casters.

Bassick casters go a long way to insure the dollies' continued efficiency under severe power-pulled service. Ask your Bassick distributor for details on Bassick casters for power pulled dollies and "live skids."

New Automatic Rustproofing for Bassick Casters

Rustproof zinc plating is an added-quality feature of Bassick formed-steel truck casters.

Now, this new $90,000 completely automatic zinc-plating machine at Bassick's Bridgeport plant puts a better, more uniform zinc plate than ever on vital metal caster parts.

Loading and unloading Bassick's new automatic zinc plating machine. Girl on right loads caster parts for trip through machine. Shiny parts on left have already been plated.

Plating tanks of new automatic zinc plating machine. "Standard Salt Spray Test" proves that zinc plate produced by machine is far better than that required by Federal Specifications.

For information on casters... ask your local distributor

There is a Bassick Caster Distributor near you. He's qualified to recommend the right caster for your job. He sees a lot of materials-handling systems and you'll benefit by his knowledge of a wide variety of industrial plants. 9.30

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence
Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

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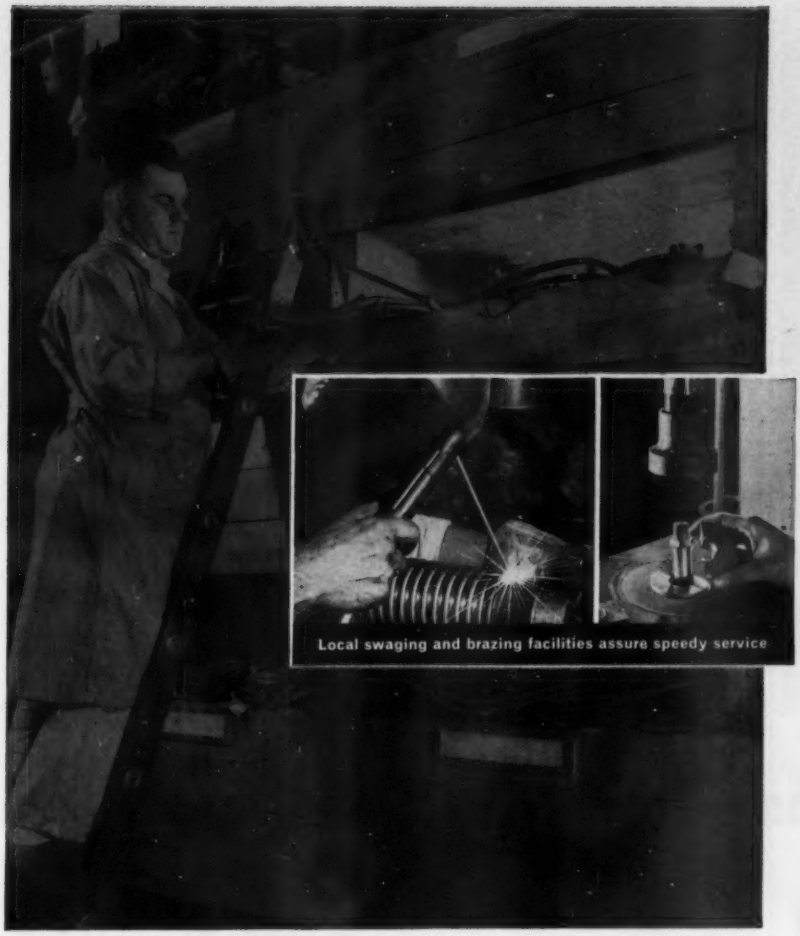

Contact your local
FLEXONICS DISTRIBUTOR
for your metal and hydraulic hose needs

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W. J. Gill Co.
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Sager-Spuck Supply
Amarillo, Texas
Radcliff Supply Co.
Atlanta, Georgia
Flexible Metal Hose Co.
Baton Rouge, La.
Capitol Rubber Co.
Birmingham, Alabama
Owen-Richards Co.
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Industrial Utilities
Brunswick, Ga.
Parker, Holmes & Langston
Buffalo, N. Y.
Buffalo Rubber Co.
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Chicago, Illinois
Dearborn Rubber Corp.
Walnor Corp.
Cincinnati, Ohio
White Industrial Sales
Clarksburg, W. Va.
Compton, Inc.
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Dayton, Ohio
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Globe Machinery & Supply
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Yale Rubber Co.
Duluth, Minnesota
W. P. & R. S. Mars Co.
Decatur, Illinois
Midstate Machinery Co.
Denver, Colorado
Plant Equipment Co.
Elizabeth, New Jersey
Industrial Rubber Co.
Fitchburg, Mass.
Hope Rubber Co., Inc.
Flint, Michigan
Grandsen-Hall & Co.
Garfield, New Jersey
Power Packing Co.
Grand Rapids, Mich.
Industrial Service
Great Bend, Kansas
Schaefer Supply Co.
Green Bay, Wisconsin
Van's Supply & Equipment
Greensboro, N. C.
Southern Rubber Co.
Hammond, Indiana
Motor & Axle Parts
Hartford, Connecticut
Fazon Engineering Co.
Hope Rubber Co.
Holyoke, Connecticut
Hope Rubber Co., Inc.
Houston, Texas
Metal Hose & Specialties
Indianapolis, Indiana
Central Rubber & Supply
Jacksonville, Florida
Holley-Edwards Sales
Parker, Holmes & Langston
Jackson, Mississippi
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Kalamazoo, Mich.
Robert M. Sorlie Co.
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Barnes & Delaney
Longview, Texas
Peerless Supply Co.
Los Angeles, California
F. D. Delafield Co.
L. A. Flexible Metal Hose
Louisville, Kentucky
Neill Laviello Supply
McKees Rock, Pa.
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Memphis, Tennessee
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New Orleans, Georgia
Gulf Belting & Gasket
Oklahoma City, Okla.
Midske Supply Co.
Omaha, Nebraska
Midco Supply Co.
Orlando, Florida
Harry P. Lee, Inc.
Paducah, Kentucky
Henry A. Petter Supply
Pampa, Texas
Radcliff Supply Co.
Philadelphia, Pa.
Airline Equipment Co.
Briggs Rubber Products
John Bridge Sons Co.
Phoenix, Arizona
Regan Manufacturing
Pittsburgh, Pa.
Goodall Rubber Co.
Gooding Rubber Co.
Lambert Jones Rubber
Portland, Oregon
Alaskan Copper & Brass
Providence, R. I.
Rhode Island Products
Richmond, Virginia
Richmond Rubber Co.
Rochester, New York
Chamberlin Rubber Co.
Sacramento, California
Sacramento Rubber Co.
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Beckley Equipment Co.
Grandsen-Hall & Co.
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Industrial Hose Supply
Seattle, Washington
Alaskan Copper & Brass
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Peerless Supply Co.
South Bend, Indiana
Power Transmission Co.
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Flexible Metal Hose Co.
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Worcester, Mass.
Brierly, Lombard Co.

PROMPT DELIVERY FROM STOCK

of your metal or hydraulic hose needs

Your local FLEXONICS distributor carries a complete stock of metal hose including corrugated and interlocked, 3/16" to 24" I. D., in steel, brass, bronze, stainless steel. Synthetic and Teflon* with pressed-on or field attachable couplings.

Your FLEXONICS distributor is an industrial hose specialist . . . depend on his ability to serve quickly and to your complete satisfaction.

Contact your local distributor for new Flexonics Metal Hose Design Guide, or write the factory.

IH-305

Flexonics

INDUSTRIAL HOSE

FLEXONICS CORPORATION • 1340 SOUTH THIRD AVENUE • MAYWOOD, ILLINOIS

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INDUSTRIAL HOSE • EXPANSION JOINT • BELLOWS • AERONAUTICAL • AUTOMOTIVE
Flexonics Research Laboratories, Elgin, Illinois
In Canada: Flexonics Corporation of Canada, Limited, Brampton, Ontario

For more facts circle 645 on Reply Card

NEW sulfamic acid-based cleaners are supplied in light, disposable cartons. They're stored and handled dry ... no spillage or breakage worries.

OLD-style liquid acid cleaners—shipped in cumbersome, returnable carboys—require careful handling to prevent breakage.

✓Safer, easy to handle

Just one of the reasons why **Dry Acid Cleaners** based on **Du Pont Sulfamic Acid** are gaining wide favor for industrial equipment cleaning: ✓ Safer to handle ✓ Easy to use ✓ No hazardous fumes ✓ Powerful descaling action ✓ Less corrosive ✓ Lower handling and shipping costs.

CLEANERS BASED ON SULFAMIC ACID REMOVE SCALE AND DEPOSITS FROM:
Steam Boilers, Condensers, Heat Exchangers, Piping.

DU PONT **Sulfamic Acid**

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Please send me:

☐ Free booklet about dry-acid cleaners based on Du Pont Sulfamic Acid

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Wilmington 98, Delaware

Name_____

Firm_____ Title_____

Address_____

City_____ State_____

For more facts circle 646 on Reply Card

NEW PRODUCTS

(Begins on page 196)

justments are necessary during the lifetime of the charger. The units are supplied in a heavy-gage, louvered steel housing with wall mounting brackets. C & D Batteries, Inc.

64—DRAWING DESK is both functional, good looking

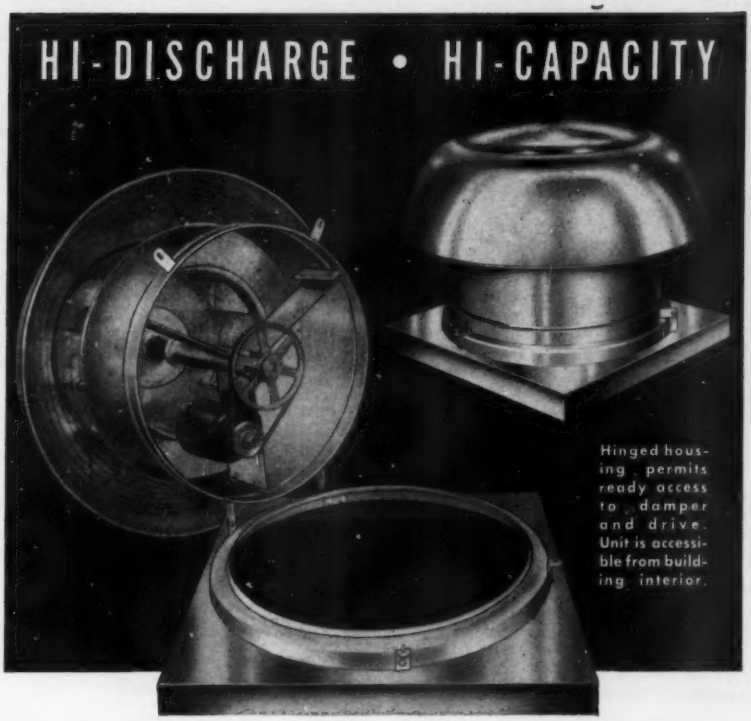
The Landmark, a high-style walnut drawing desk, is introduced to meet both functional and esthetic requirements of engineering offices. Unusual feature is an attached side auxiliary unit which offers tool, catalog and tracing storage and space-saving working area just a quarter-turn from the desk. The Landmark has walnut-paneled sides with contrastic off-white drawing-work surfaces and satin chrome trim. Adaptable for individual office or prestige multiple in-

stallations, this desk has three basic components: front table, basic table and rear reference desk.

The front table can be used alone or to head a row installation. It has an adjustable board but no storage area in front. The basic table combines drawing and reference areas. Placed behind a front unit, this one offers a reference surface and storage area for the front man and a drawing surface for the second. The row can be continued with as many basic tables as required and the last man furnished with a rear reference desk. Both front and basic tables have matching right- or left-side auxiliary units. Hamilton Mfg. Co.

65—STARTERS for air conditioner compressor motors

Two contactors and starters are for control of air conditioning compressor motors from 7½ through 20 hp. Ratings are 50 and 60 amp, 110/220 v, or at 25 and 30 amp, 440/550 v. The new forms can be furnished with two or three poles, and either can be ordered with one auxiliary contact. Starters can be had with quick-trip overload relays for protecting hermetically sealed motors. Open or NEMA Type 1 enclosures can be used. The starters are also available with conventional overload


HI-DISCHARGE • HI-CAPACITY
Hinged housing permits ready access to damper and drive. Unit is accessible from building interior.

...new JENN-AIR "HI-D" Power Roof Exhausters

When specifications call for an exhaust fan with BIG air moving capacity, they call for Jenn-Air's new "Hi-D" Power Exhausters. Designed in both axial and centrifugal wheel models, these belt drive units offer capacity ratings in a broad range from 480 to 28,650 cfm.

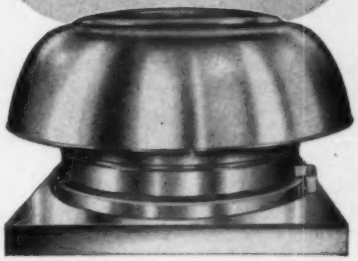
In addition to high capacity, Jenn-Air "Hi-D" Exhausters provide these important design features:

- Wheel is located above motor to combine high discharge point with an overall installed height lower than any comparably-rated exhauster.
- Non-overloading wheel, made of heavy gauge aluminum, is dynamically and statically balanced in the Jenn-Air Sound Laboratory.
- Exclusive guide vane construction improves air moving efficiency while minimizing turbulence and noise.
- Adjustable motor pulley permits speed variation.
- Totally enclosed motor and tubular drive assembly feature permanently sealed, pre-lubricated ball bearings. Motor is effectively cooled by air stream.
- Bird guard of heavy gauge stainless steel is an integral part of every unit.
- Maintenance-free aluminum housing provides strength without weight.

The HAB Series of "Hi-D" Exhausters (axial blade) gives highest air-per-dollar value in short duct runs where static pressures are negligible. The HCB Series (centrifugal wheel) effectively overcomes static pressures and is usually preferred for long duct runs. Its smaller diameter permits a corresponding reduction in duct size.

JENN-AIR

All-Aluminum LOW-CONTOUR RELIEF VENTS

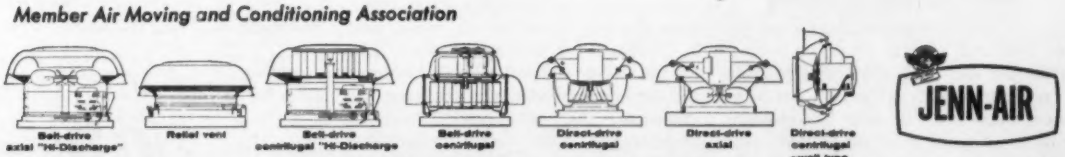


For fresh air intakes or pressure relief within buildings, specify Jenn-Air relief vents. These high-discharge units are designed in seven sizes . . . built to handle from 356 to 18,350 cubic feet per minute. Weather proof, bird proof Jenn-Air relief vents eliminate unsightly goosenecks and hoods.

Specially designed hinge on housing permits ready access to damper. Simple locking mechanism keeps unit tightly closed.

Ask your Jenn-Air representative for performance and dimensional data on the complete line of Jenn-Air Power Exhausters and Relief Vents.

Member Air Moving and Conditioning Association



Jenn-Air Products Company, Inc. • 1102 Stadium Drive, Indianapolis 7, Indiana

For more facts circle 647 on Reply Card

NEW PRODUCTS

(Begins on page 196)

relays for use on air conditioning loads. The contactor can be used also for a-c non-inductive heating applications. Small size, straight-through wiring and manufacturer's strong-box coil are among features. General Electric Co.

66—FLOOR MACHINE cleans 21,600 sq ft per hour

Two models of a battery-powered scrubber-vacuum floor maintenance machine, Mark 20 and Mark 26, are engineered to clean up to 21,600 sq ft of floor per operating hour. According to manufacturer, the series is de-

signed to operate in any industrial area and quiet action makes it particularly suitable where noise reduction is desirable. The machines are powered by four 6-v, 25-plate batteries with an operating life of 6 to 8 hr. An installation requiring two or more shifts requires extra sets of batteries. Length of the operating cycle between chargings is dependent on floor condition.

Mark 20 has two counter-rotating 11-in. brushes which clean a path 20 in. wide; Mark 26 has two 13-in. brushes, cleans a 24-in. width. The compact machines have a 17-gal solution dispenser tank and 19-gal pick-up tank. A small battery charger is included as standard equipment. Batteries may be charged on the machine or rolled out on a charging stand. Finnell System, Inc.

67—ADHESIVE-SEALER can repair almost anything

Liquid Iron is announced as a putty-like synthetic plastic that sets into a substance like iron a few hours after it is mixed with a liquid hardner. Once hardened, it can be ground, sanded, shaped, filed or drilled. According to manufacturer, a liquid Iron bond retains its strength under heat up to 300 F, and cold down to zero, and is generally stronger than the materials bonded together. Among many applications are repair of worn valves, machinery and castings.

Liquid Iron comes in a package containing a jar of putty-like base and a vial of hardener. When the two units are mixed a chemical reaction takes place. You put the mixture on with putty knife or trowel and it begins to harden within an hour, is fully hardened by 24 hr. Neither heat nor pressure is required, but heat speeds hardening. Durable, non-shrinking and non-expanding. Liquid Iron withstands mild acids and alkalis, it is claimed, and can be painted with any type of paint. You can use it with iron, bronze, wood, aluminum, brass, porcelain, glass, marble, other materials. Cycleweld Chemical Products Div., Chrysler Corp.

68—LIGHT TRAYS are easy to stack and nest

Incorporating a pair of nesting stops riveted to each end, these trays are lighter, smoother and easier to handle than earlier models, according to manufacturer. They are made of vulcanized fiber, a tough, lightweight cellulose plastic, and are especially suited for conveyor use because they have no protrusions or sharp points. The nesting stops, which replace wood strips formerly used, result in less weight and serve to keep the trays from wedging tightly into one an-

other, yet do not interfere with handling and movement. Anchored to the nesting stops are metal stacking arms that swing over tray tops to permit stacking. The trays are cleaned by wiping with a damp cloth. A wide range of sizes is offered. National Vulcanized Fiber Co.

69—PUMP-TANK COMBO for general chemical feeding

This compact and low cost pump-tank combination incorporates Proportioneers Model 1106 Adjust-O-Feeder and is designed for minimum space. The 55-gal steel support drum contains the molded polyethylene tank for the chemicals and is mounted atop a three-legged angle iron frame. The pump, with its strainer, fittings and hoses, is mounted on cross members

G-B SNAP*ON DISTRIBUTORS

(See ad on facing page)

AKRON, Ohio, The Asbestos Supply Co.
ALBANY, Ga., Industry Insulation Co.
ALBANY, N. Y., Hudson Valley Asbestos Corp.
ALBUQUERQUE, N. M., Mt. States Insulation Co.
AMARILLO, McDonald Engineering & Insulating Co.
Morrison Supply Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
AUSTIN, Tex., Cinbar Engineering Co.
BALTIMORE, Md., Leroy Insulation Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply Co.
Reynolds Aluminum Supply Co.
BOSTON, Mass., Homans-Kohler, Inc.
BUFFALO, N. Y., Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Prod. Co.
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CHICAGO, Ill., E. C. Carlson Co.
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CHILLICOTHE, Ohio, Southern Ohio Insulating Co.
CLEVELAND, Ohio, Ohio Asbestos & Insulation Co.
COLUMBIA, S. C., Industrial Insulation Div. of Richland Oil Co.
COLUMBUS, Ohio, Santeler Brothers
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CORPUS CHRISTI, Tex., Precision Insulation Co.
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LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Thorpe Insulation Co.
Western Fibrous Glass Products Co.
LOUISVILLE, Ky., General Insulation & Roofing Co.
LUBBOCK, Tex., Morrison Supply Co.
MACON, Ga., Industry Insulation Co.
MEMPHIS, Tenn., John A. Denie's Sons, Co.
Gibbons Supply Co.
MIAMI, Fla., Reynolds Aluminum Supply Co.
Southern Metal Products Co.
MILWAUKEE, Wisc., F. R. Dengel Co.
MINNEAPOLIS, Minn., Asbestos Products, Inc.
MOORHEAD, Minn., Fargo-Moorhead Insulation Co.
NASHVILLE, Tenn., Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW ORLEANS, La., Eagle Asbestos & Packing Co.
NEW YORK, N. Y., Eastern Steam Specialty Co.
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ORANGE, Conn., Insulation Supply Co.
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PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
PITTSBURGH, Pa., Dravo Corp.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROANOKE, Va., C. E. Thurston Co.
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SHREVEPORT, La., Frith Sales Co.
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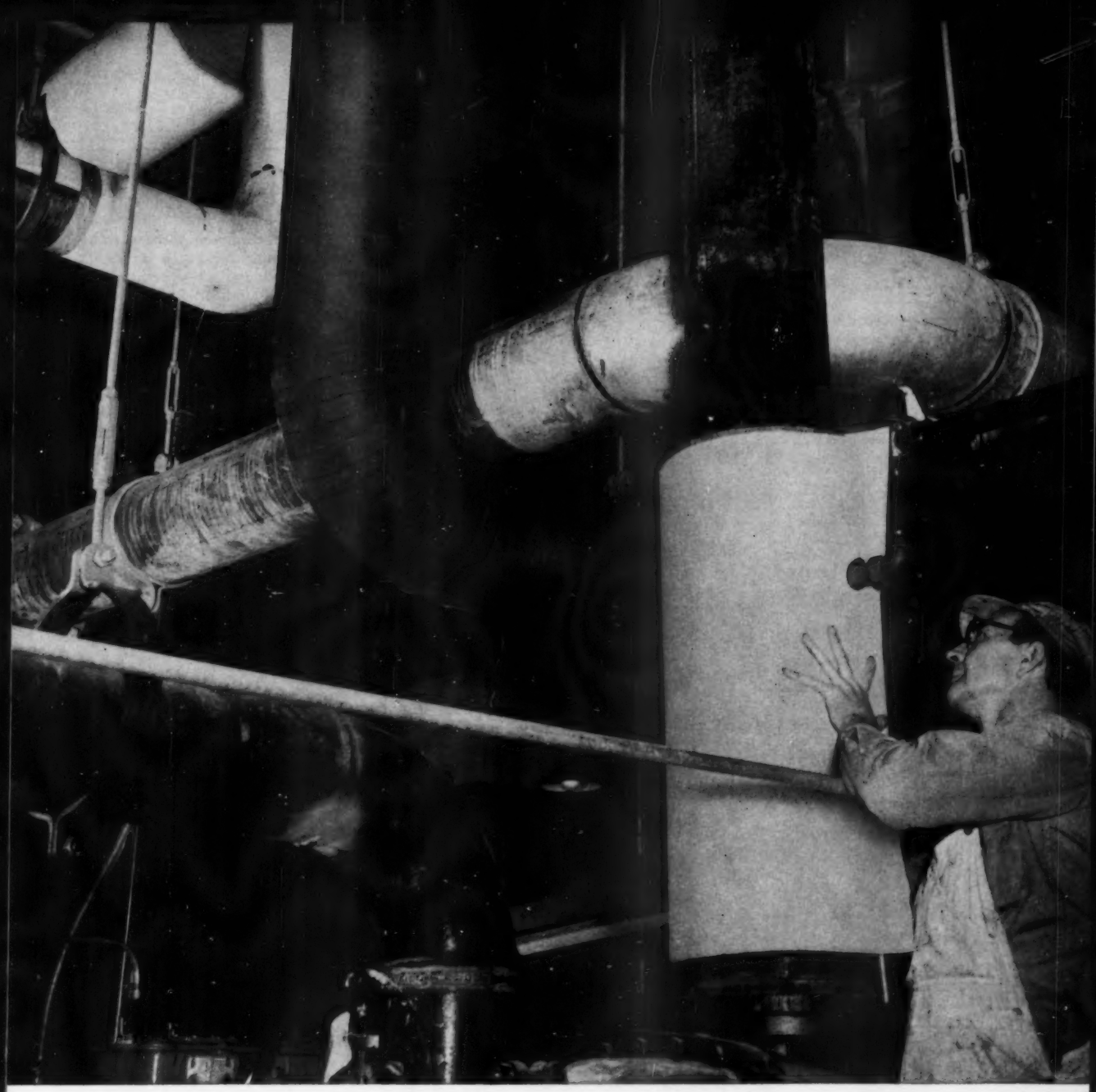
SYRACUSE, N. Y., Burnett Process, Inc.
TALLAHASSEE, Fla., Baker's, Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
VANCOUVER, B. C., Fleck Brothers, Ltd.
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WICHITA, Kans., General Metals, Inc.

GUSTIN gb BACON



They compared "K" factors and cost factors . . . and bought G-B SNAP*ON®

FOR FREE TEVA SURVEY CALL YOUR LOCAL G-B SNAP*ON DISTRIBUTOR ADJOINING COLUMN LISTED IN

Compare insulations for plant piping jobs, for example — and you will agree that for economy, performance, and thermal efficiency, there is *nothing* like G-B Snap*On, the original one-piece pipe insulation molded of fine glass fibers. It's far cheaper to apply under all plant conditions—crowded quarters . . . long straight lines . . . hot or cold piping that involves numerous bends, valves, and obstructions. And G-B Snap*On is the only one-piece insulation available in a complete range of sizes from copper tubing to 36″, plain or with jackets. But see for yourself—ask your local G-B distributor to make a TEVA (Thermo-Economic Value Analysis) survey so you can compare "K" factors and cost factors as they apply to your own insulating jobs.

GUSTIN-BACON *Manufacturing Co*

GUSTIN gb BACON

232 W. 10th St., Kansas City, Mo.

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Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities — Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
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In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

For more facts circle 649 on Reply Card

NEW PRODUCTS

(Begins on page 196)

of the frame. The entire unit stands only 53 in. high. Tank, fittings and tubing are of corrosion-resistant materials. Pumping capacity is up to 50 gph for discharge pressures up to 1100 lb. B-I-F Industries, Inc.

70—EXTENSION GUN sprays heavier materials

Roof coatings and similar heavy materials can be applied more quickly, economically and efficiently, it is announced, with this pole type extension gun. Especially designed to

handle roof coatings, concrete curing mixtures, foundation coatings, black top sealers, steel tank coatings and sound deadeners, gun has ¼-in. internal nozzle combination which sprays heavy material in large, round pattern for uniform coverage of desired thickness. Air and fluid are controlled by lever handle valves, with fluid pipe and metal air tube reinforced by clamp type spacers. Nozzle sprays in a large round pattern. The DeVilbiss Co.

71—FUEL VALVE offers increased flow, greater safety

Hi-flo Valves incorporate straight-through, non-turbulent flow with a fast-acting, fail-safe shut off. These valves are used for on-off control and safety shut off for gas-fired boilers, heat treating furnaces, drying equipment etc. Their design is said to offer advantages over globe type valves, including delivery of up to three times greater flow for a given line size because the inner valve in the open position is withdrawn from the main gas stream. Hi-flo Valves are self-contained and their construction eliminates reduction gears and linkages. Both manually reset and electrically reset actuators are offered. Pipe sizes from 1 to 6 in. are accommodated; gas capacities up to 54,000 cu

THERE MUST BE AN EASIER WAY

SUPPLYING BRANCHES AND SUBCONTRACTORS WITH BLUEPRINTS —IT'S EITHER A FAMINE OR A FEAST
WHAT'S THAT —WE DIDN'T SEND ENOUGH PRINTS FOR HALF YOUR MEN AT CAPE CANAVERAL?
LAST WEEK HE SENT 200 TO A GUY WHO NEEDED ONLY ONE
HOW DOES HE DECIDE—FLIP A COIN OR SPIN A ROULETTE WHEEL?
WE COULD THROW A BRAWL WITH THE AIR MAIL CHARGES ON THAT STACK MAZIE'S SENDING OUT
I KEEP TELLING HIM IF WE HAD A BLUEPRINTER MAKE AUTOPOSITIVE PAPER INTERMEDIATES WE'D ONLY HAVE TO SEND ONE OF THEM TO EVERYONE

Much easier for you, and much less costly, too, when you mail a Kodagraph Autopositive Paper intermediate instead of a bundle of blueprints.

These low-cost photographic intermediates, which can be made quickly by your local blueprinter or your own print room, end guesswork, waste and delays at both ends of the line.

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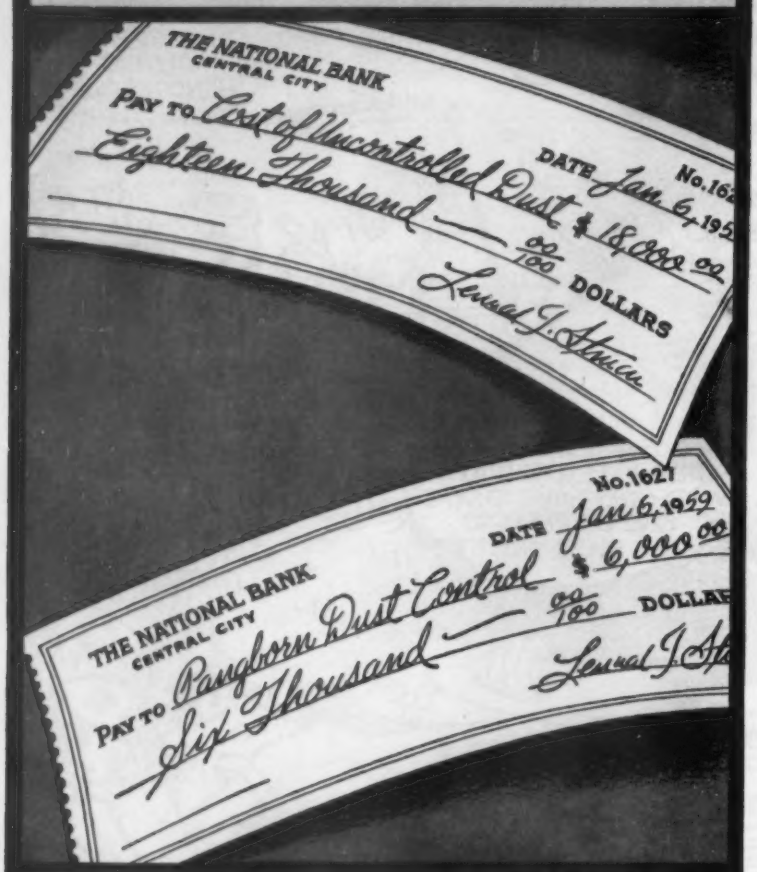
WHICH CHECK WOULD YOU RATHER WRITE?



How much are you paying for uncontrolled dust?

See for yourself—add up the cost of your lost salvageable material, housekeeping expenses, excess machine wear, intangibles such as community and employee goodwill. Whether your total is moderate or high, Pangborn Dust Control will cost you *less* than uncontrolled dust.

For details on Pangborn's engineering knowledge and experience, talk to the Pangborn man in your area or write PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Maryland. *Manufacturers of Dust Control and Blast Cleaning Equipment — Rotoblast® Steel Shot and Grit.*

Pangborn CONTROLS DUST

For more facts circle 651 on Reply Card

NEW PRODUCTS

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ft per hour at 1 in. pressure drop are handled based on 0.7 specific gravity of the gas. General Controls, Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 279-280.

72—TWO MOTOR VIBRATOR with synchronous action

Model RC-31 is designed to produce straight line vibration, in any direction. It operates on a rotating eccentric weight principle and features adjustable eccentrics, permitting force of vibration to be varied without

changing weights. There are four weights, two on each motor, contra-rotating. Variable impact range is 640 to 2200 lb and impact changes can be made quickly. Because there are no pulleys or belts within this totally-enclosed vibrator, operation is declared practically noiseless. It is suggested for heavy-duty applications requiring continuous flow of bulk materials. Cleveland Vibrator Co.

73—SKYLIGHT PANELS of translucent fiber glass

Econo-Lux Visadomes, for use as skylights on curbs and slope roof applications, are suggested wherever the combination of filtered light and low heat penetration is desirable, for new or existing structures. Two models are offered, one being an open-domed, press-molded panel of 1/16-in. thick polyester resin reinforced with glass fibers. The other is of similar design but permanently sealed by a sheet of crystal Econo-Lux heat-welded to the underside of the panel. This unit is ⅛ in. thick at the flange. Its sealed dome creates a "dead air" pocket between top and base to provide more effective thermal insulation

Tuffy Tips —on safe use of Slings and Hoist Lines

Safety in Hoisting Saves Costly Injuries

During a recent 12-months' period lost-time back injuries reported in one state (California) totaled 32,643. Lost-time injuries caused by strain or over-exertion: 24,639. A high price to pay—in misery and money—for lifting, pushing or carrying loads. Medical aid and compensation costs of materials handling accidents run far into the millions every year. Proper hoisting equipment, properly used and maintained, is one important answer to this problem. It may save your workers disabling injury, and save you expensive absenteeism and lost production.

Kinks Are No Hazard with Tuffy Slings

One of the first rules of safety: never use a *wire rope* sling that has been kinked. Not so with Tuffy Slings. Tuffy's patented, 9-part machine-braided fabric is just about impossible to kink. And if it should, it's easy to straighten out the kink, leaving no material damage.

Unique Ferrule Gives the Eye Splice Full Fabric Strength

The steel ferrule is slipped over the tuck-splice of the sling eye and pressed on under tremendous pressure. It gives the eye splice 100% of fabric strength. No abrupt edges or rough projections to injure hands and slow down work. And there's no extra cost for this extra efficiency and safety feature!

Rules for Safe Use of Hoists

1. **DON'T LET MUSCLES** do what a proper size hoist should do.

2. **SMALL HOISTS** aren't expensive. With proper slings and hoist lines, they will help greatly in reducing injuries to workers.

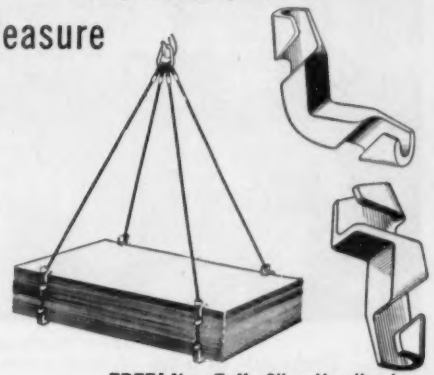
3. **USE THE RIGHT SLING AND HOIST LINE** for the job. Tuffy Slings and Hoist lines are "tailored" to every need, from the smallest block and tackle to giant cranes and other equipment.

4. **DON'T ASSUME** that all slings are right for all kinds of lifting. Your Tuffy distributor will help you select the right ones.

Proper Fittings Are An Important Safety Measure

Fittings used on Tuffy Slings are designed for a broad and varied range of needs. Your Tuffy distributor, or Union Wire Rope engineers, will be glad to advise you on the correct fittings for greatest service and safety for any wire rope rigging.

Shown here are Newco Sling Saddles, fittings that are widely used to protect loads and lengthen the life of slings. These saddles are made in two types: Type B and Type T. Both are shown in the illustration. Type T is used at the top of the load; type B at the bottom. They can be changed quickly from one sling to another. They eliminate the strand cutting that occurs around 90° edges and protect the load. Full data on dimensions and weights for Newco Sling Saddles—and the full line of sling fittings—are included in the Tuffy Sling Handbook that's yours for the asking (see below).



FREE! New Tuffy Sling Handbook

Revised, enlarged edition. Covers slings and sling fittings from A to Z. Gives types, dimensions, weights and rated loads. Send for your copy now. Address **Union Wire Rope Corporation, 2272 Manchester Ave., Kansas City, Mo.** Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

Use Tuffy Hoist Line for Greatest Economy and Safety

Tuffy Hoist Line and Tuffy Slings are the ideal team for efficient hoisting at lowest cost per ton-mile. The extra strength, toughness and service life we build into the Tuffys cost you nothing extra.

Your Tuffy Distributor Offers the Most in Service and Savings

UNION Wire Rope

S-5

Subsidiary of **ARMCO STEEL CORPORATION**

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

New steels are born at Armco

For more facts circle 652 on Reply Card

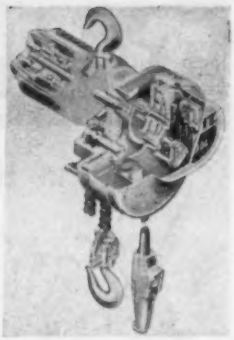
NEW PRODUCTS

(Begins on page 196)

and reduce moisture condensation.

Standard colors are light green, crystal and red and light transmission ranges from 55 to 85 per cent, depending on color and application. Each panel is 36 by 36 in., which includes a surrounding flat flange extending 3 in. from curvature of dome to edge. Dome rise is 3 in. at center. The open-dome units cost around $15 each, and the sealed dome models, about $30. Steelite Buildings, Inc.

74—PUSH BUTTON HOIST can lift 2 tons



Push button models of this company's Budgit Portable Electric Hoists come in the same sizes as those with pull cord control, capacities from 250 to 4000 lb, each capacity in various lifts, speeds, single- or multi-phase currents. Among new features are a molded fiber glass control handle with comfortable grip and easy-to-use push buttons, located in an "over and under" fashion, with interlock to prevent depressing both buttons simultaneously. Other features announced are a safe 24-v at the push buttons on models having high voltage, multi-phase motor currents, and a control cord with built-in strain reliever cable to permit pulling of hoist and load by the control handle. The hoists have a centralized electrical compartment with a removable molded fiber glass cover. These hoists have many common design features with pull cord models, which affords interchangeability of parts. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

75—PRY BAR UNIT features enclosed motor

Newest of this manufacturer's Tug-Bars is an enclosed motor unit supplied in three models: 1201 for 110 v a-c; 1203 for 200 v 400 cycles; and 1204 for 28 v d-c. Tug-Bars are

designed for close-quarter load handling where there is insufficient room for a fork lift to operate—as in and around aircraft. With Tug-Bar, one man can handle a 2-ton load in confined space. Catalog 5919 gives details. Western Gear Corp.

76—ROOF PAINT protects, insulates, decorates

Temp-Trol is a colored aluminum roof and siding paint said to cool building interiors up to 15 deg in summer while retaining heat during colder months. It comes in pastel colors and platinum white. According to manufacturer it insulates, waterproofs, and weatherproofs a roof for 10 yr. Temp-Trol's weatherproofing and insulating qualities are attributed to a combination of Alcoa flaked aluminum pigments and asbestos fibers in an alkyd resin base. A single coating is claimed to deposit a leak-sealing shield four times thicker than conventional paint. It is applied with wall brush or roofer's brush. Re-

Thousands of miles of underground pipe feed natural gas to factories . . . other pipelines distribute oil and other petroleum products. And every foot . . . every inch . . . could corrode and leak anytime, day or night.

Electro Rust-Proofing can assist in the big job of corrosion control. Assist with surveys, design recommendations and actual installation of corrosion control systems.

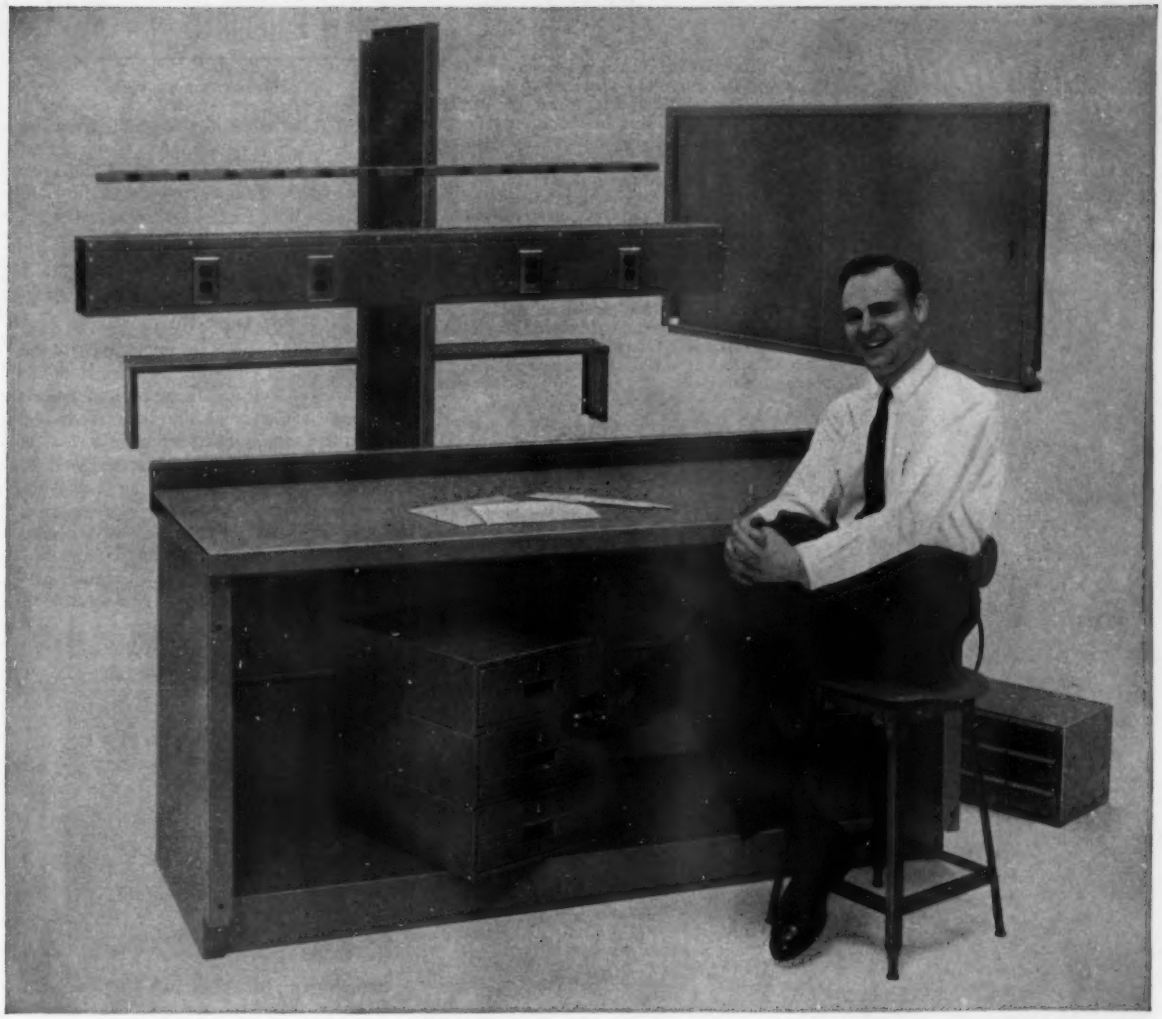
Even if you have your own corrosion engineering group, ERP can swing extra manpower and engineering experience onto rush jobs—supplement your own team on the special problems.

For full information on ERP Pipeline Corrosion Control, Write Dept. E-52.72.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

For more facts circle 653 on Reply Card



Arrangeable, changeable, and everything custom but the price

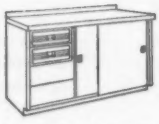
Your cabinet bench requirements are peculiar to your business, to your way of operation. Ordinarily this might call for a custom installation at an unjustifiably high price were it not for Hallowell.

There are so many variations of the basic Hallowell Cabinet Bench that you can have custom convenience, custom arrangement and custom quality at standard bench prices. There's more to the story.

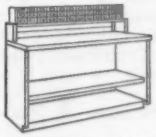
Change as your needs change—
Start with Hallowell Cabinet Benches and you can count on years of service. Should your requirements ever change, you can easily and quickly change these cabinets, paying only for any parts or accessories you add.

CUSTOM-TAILOR HALLOWELL CABINET BENCHES TO YOUR SPECIFIC NEEDS

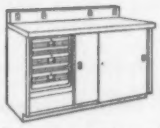
Add shelves . . .



Add doors or drawers



Add storage wall units



Or an electrical panel

Or combinations of these or many other accessories available from stock.

See your authorized Hallowell Distributor or write direct

COLUMBIA-HALLOWELL Division SPS JENKINTOWN 26, PA. • SPS WESTERN, SANTA ANA, CAL.

For more facts circle 654 on Reply Card

Only Whitney MSL* Chain Provides Complete BUILT-IN LUBRICATION At All 3 Critical Areas

Whitney MSL Chain is lubricated for life by oil-impregnated, sintered steel bushings —an exclusive development of Whitney Research. With this development, Whitney solves a basic chain problem . . . more damage is caused by faulty chain lubrication than by years of normal service. Pressure and heat cause built-in lubricant to expand and flow from bushings, providing a constant supply of lubricant to every working part of the chain. When drive stops, bushings re-absorb oil, ensuring a permanent oil supply for the life of the chain. By solving the lubrication problem, and because of other important design advantages, Whitney MSL Chain outlasts conventional chain as much as 5 to 1 in severe operating environments.

Critical Area 1

PIN—Protective film of oil completely lubricates the live bearing area between pin and bushing, minimizing wear by reducing metal-to-metal contact.

Critical Area 2

PLATES—Whitney oil-impregnated sintered steel bushings extend beyond surface of inside plates to: act as lubricated thrust bearings, control clearance, and provide an oil cushion between plates, eliminating plate galling and seizing frequently caused by misalignment of sprockets.

Critical Area 3

SPROCKET ENGAGEMENT — Oil film on exterior surface of Whitney MSL Sintered Steel Bushings provides constant lubrication between sprocket teeth and chain. Whitney MSL Chain requires no rollers, as the tough oil film on the bushing surface provides smooth sprocket engagement, cushions impact and reduces drive wear.

Whitney oil-impregnated bushings—developed through continuous Whitney Research—are produced exclusively by Whitney to assure MSL Chain users of highest quality and reliability.

Inherent material characteristics of Whitney Sintered Steel Bushings, plus bushing configuration that provides greater contact area between bushings and links, permit high interference fit, which pre-loads links and gives maximum fatigue resistance.

Controlled clearance between plates promotes self-cleaning action.

WHITNEY MSL CHAIN MEETS ASA STANDARDS

All essential dimensions of Whitney Standard and Extended Pitch MSL Chain conform fully to ASA Standards, making it completely interchangeable with any similiar pitch ASA standard chain, simplifying specification for new equipment, or as a replacement for existing drives.

Whitney MSL Chain is carried in stock by Distributors in all parts of the United States, for prompt delivery.

***Maximum Service Life**

Whitney *Advanced Design is a Whitney Tradition*
CHAIN COMPANY

A Subsidiary of Foote Bros. Gear and Machine Corporation | 4583 S. WESTERN BOULEVARD CHICAGO 9, ILLINOIS

For more facts circle 655 on Reply Card

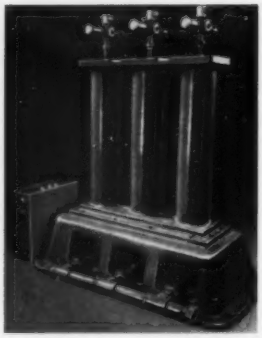
NEW PRODUCTS

(Begins on page 196)

ported suitable for asphalt shingles, asbestos-cement shingles, composition roofing, slate, corrugated metal and tar paper, Temp-Trol acts as its own primer, fills cracks and minor imperfections. Sapolin Paints Inc.

77—PUMP handles almost anything that flows

With only nine moving parts, the Free-Piston Pump is reported to pump everything from molten metals to ice cream, including slurry, sludge, acids, semi-solids in stainless steel chambers. This pump is designed to impel a continuous air-free flow without pulsating or surging. It requires no safety or relief valves, says manufacturer; when a stoppage occurs, the pump stops. It can be operated submerged, if required. The pump is



operated by compressed air introduced into each cylinder in sequence; while the left cylinder is discharging, the center cylinder has filled and is waiting, and the right is filling. Chambers fill by gravity. In each chamber is a nylon free-floating piston and two nylon ball valves. Operation is automatically controlled by a separate control box. It is noted that because one chamber can be stopped while the other two continue to function, the pump can operate indefinitely without shutdown. It can be made in any size. The Crossley Machine Co.

78—SPEED REDUCERS are 25:1 double reduction units

Shaft-mounted speed reducers in the Torque-Arm line now include a 25:1 double reduction series in eight sizes. Design improvements in the double reduction units have not changed overall dimensions or horsepower ratings. Both 15:1 and 25:1 gear ratios are available in housings of identical dimensions and at same prices. Output speeds range from 12 to 400

Science for the world's well-being

Pfizer

Since 1849

"A very satisfactory and dependable Boiler" says C. V. Reichelt, Director of Engineering, Chas. Pfizer & Co., Inc.

Pfizer headquarters: executive offices and research laboratories in Brooklyn, New York. In the associated production plant, a modern Combustion VU-50 Boiler has been meeting essential heat and processing requirements during the past four years by producing 140,000 lbs of steam per hour.

Pfizer's Vigo Plant relies on four Combustion VM Boilers fired by C-E Spreader Stokers for economical heating and processing. Well suited to fill local needs, these units are each rated at 30,000 lbs of steam per hour at an operating pressure of 150 psi. In various Pfizer plants, nine C-E units have a total steam production capability of 740,000 lbs of steam per hour.

At this large Pfizer fermentation and organic synthesis plant in Groton, Conn., a new C-E Vertical-Unit Boiler, Type VU-50X, has just been placed on the line. Rated at 165,000 lbs of steam per hour — a new high for Pfizer — it joins three other oil fired C-E boilers, two VU-40 units and one VU-50 unit, already in service at the plant. Each is rated at 115,000 lbs/hr.

When Chas. Pfizer & Co., Inc., recently put into service a new C-E Vertical-Unit Boiler in their Groton, Conn., fermentation and organic synthesis plant, they were capitalizing on long experience. Eight previous C-E units, three of them at Groton, had been producing steam efficiently in Pfizer plants since 1948.

Mr. C. V. Reichelt, Director of Engineering, describes Pfizer's experience with its latest C-E unit as follows: *"The new 165,000 lb/hr boiler . . . is proving to be a very satisfactory and dependable unit. Particular commendation is made of the refinements with regard to air pre-heater and fly ash arrestors which Combustion Engineering included in their design. Special mention is also made of the fine job that was done in getting the boiler on the line on time in spite of a tight schedule for fabrication and erection. This boiler is the fourth and largest C-E boiler installed at our Groton facilities."*

With three other C-E Boilers at Groton, this unit is now producing steam for power and process in the production of the well-known Pfizer antibiotics such as Terramycin as well as for a wide range of pharmaceuticals and chemical and agricultural products.

Pfizer's experience with C-E boilers extends beyond Groton, too. At Terre Haute, Indiana, the company's Vigo Plant uses four Combustion boilers fired by C-E Spreader Stokers; and at the Brooklyn Plant, the company's original "shop", dating back to 1849, another C-E Boiler is entering its fourth year of service.

Today, in more than 100 countries around the world, Pfizer "Science for the world's well-being" contributes to the advance of medicine, agriculture and industry. Combustion Engineering is proud to have a share in this march of scientific progress.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

C-E

C-231A

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 656 on Reply Card

NEW PRODUCTS

(Begins on page 196)

rpm. Giant of the series is size TD11, described as the world's largest shaft-mounted reducer offered from stock. Its reduction ratio is 24.73:1 and it is rated at 154 hp at 75 rpm.

In redesigning these reducers, manufacturer has utilized an improved method of attaching the torque arm to the reducer case, employing a saddle-type bracket for strength and better balance. It is noted that while the 15:1 reducers are suitable for most applications, the new 25:1 units give 40 per cent lower output speeds with identical motor speeds and V-drive ratios. When output speeds are the same, lower ratio V-drives may be used with the 25:1 units at lower cost. Bulletin A692 gives details. Dodge Mfg. Corp.

79—LIQUID METALLIC SIDING waterproofs, insulates

Aluma-Chron is described as a liquid metallic siding in a range of colors that waterproofs and insulates in one coat. It combines durability and insulation of aluminum with the beauty

of paint, and is said to provide a vapor-proof barrier, impervious to moisture. It is suggested for cement and block constructions, asbestos cement siding, quonset buildings, metal cribs and tanks. Coverage will run 100 sq ft per gal on metal to 50 sq ft on cement. Using 40 lb of pressure, ¼-in. nozzle, 6000 sq ft can be sprayed in 8 hr, manufacturer states. Pace Products, Inc.

80—FORK LIFT TRUCK works in narrow aisles

By operating in aisles 4 to 6 ft narrower than conventional lift trucks require, the Naro-Aisle Stacker is said to increase average storage capacity as much as 50 per cent. Equipped

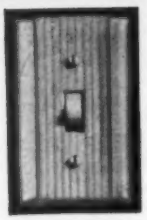
with hydraulically operated outriggers, the truck performs right or left angle stacking, lifts loads at a speed of 70 ft per min, maneuvers safely through congested warehouse areas, company says, and has the speed and agility and sitdown comfort of traditional fork lift trucks. Towmotor Corp.

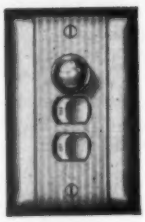
81—GAS BURNER SYSTEM for industrial air heating

The Airflo Gas Burner System offers flexibility of temperatures and loads because of its 25-to-1 throttling range. Based upon the principle of using oxygen from the air being heated, the system may be used on re-circulating and single-flow systems. It can be installed on ovens, kilns, dryers and for heating make-up air. The burner mounts in the duct carrying the flow of air to be heated and the mixer unit delivering proportioned

Built to take it... Indefinitely!

THE NEW P&S ROCKER-GLO SWITCH





Here is a switch that can take it . . . and come back for more. Install Rocker-Glo in the most used and abused stations in institutional, commercial or factory building. Then watch its continuous, perfect, satin-smooth performance.

P&S Rocker-Glo switches are AC switches, designed to be used at full current ratings on tungsten filament and fluorescent loads – one does the work of two AC-DC switches for controlling fluorescent fixtures. Rocker-Glo can be used anywhere old-style toggle switches are used.

Rocker-Glo is sturdily constructed. Its rugged, wall-hugging luminous rocker is not subject to breakage from accidental blows as is the case with ordinary switch handles. It's built to withstand punishment ordinary toggle or specialty switches cannot take – changes no wiring habits. Single Pole and Double Pole switches are indicating – you can tell when they're on or off.

Available in Despard interchangeable type, Despard Type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts AC.

For more information write Dept. PE-959

P&S

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SYRACUSE 9, NEW YORK
60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill.
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MAKE THE COMPLETE JOB COMPLETELY P&S

For more facts circle 657 on Reply Card

When production flow depends on a heavy duty hoist . . .

LO-HED® PERFORMANCE COMES BEFORE PRICE.

When you hit the *really* tough aerial handling problems . . . in places where production flow depends upon continuous hoist performance, and hoist down-time means lost production . . . you need the extra margin of heavy duty performance that only an AE LO-HED hoist can give. Or when you bump into tough headroom problems, LO-HED hoists give you extra feet of lifting height . . . lift loads closer to the ceiling—give you maximum use of every cubic foot in the hoisting area.

The AE LO-HED is built for these trouble spots . . . the spots in your plant where conventional heavy duty hoists just aren't "heavy duty" enough . . . the spots where you are hemmed in by fixed ceiling height . . . the spots where performance comes before price.

For complete information and specifications, refer to Sweets Plant Engineering File 1a/Ae, or write for your copy of our new catalog H-59. AMERICAN ENGINEERING COMPANY, Dept. H-164, Philadelphia 37, Penna.

AMERICAN ENGINEERING COMPANY

Hele-Shaw and Hydramite Pumps • Lo-Hed Hoists • Vibra-Grate, Perfect Spread and Taylor Stokers

AE Marine Deck Auxiliaries.

For more facts circle 658 on Reply Card

dependable air...

Packaged Air-Cooled Compressors—
½ through 20 horsepower

Other Compressors to 6000 Horsepower

You can't minimize the importance of a reliable source of compressed air.

Ingersoll-Rand Compressors are designed and built for maximum performance with minimum maintenance.

If your plant is in need of an air-cooled compressor in the ½ through 20 horsepower range . . . don't gamble, make sure you get the *Best.*

Ingersoll-Rand

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3-494

For more facts circle 659 on Reply Card

NEW PRODUCTS

(Begins on page 196)

air-gas mixture to the burner is mounted outside the duct. Control of firing rate by means of a single lever simplifies automatic control. Maxon Premix Burner Co.

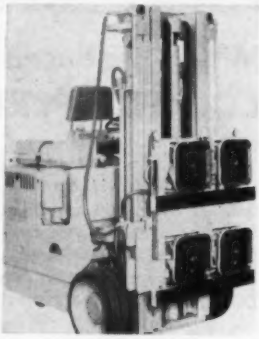
82—DIAL THERMOMETER for temperatures to 1100 F

Model TMF, Dial Thermometer, for ranges up to 1100 F has a reinforced plastic case and may be flush or wall-

mounted. It features a large, easily-read dial and comes in a blue-gray color. Other colors can be ordered. Ten scale ranges are applicable with this instrument. Partlow Corp.

83—VACUUM DEVICE for handling cased materials

For use on lift trucks, this vacuum powered attachment simplifies handling of large cartoned goods. It is designed to hold up to four large, filled cartons at once through suction created by four vacuum cups on the truck carriage. No clamp or fork arrangement forward of the carriage is



required. Pallets or other carrying devices are unnecessary. The attachment can be mounted on manufacturer's gas or electric powered trucks with power packages to accommodate

Improved cutting performance . . . plus rancidity control

From Esso Research after two years of field testing comes a new heavy-duty emulsifiable cutting oil that combines all these outstanding advantages:

Deeper cuts, faster speeds, longer tool life. Kutwell EP 66 contains extreme pressure agents that enable it to handle the toughest cutting, grinding, sawing and drilling jobs. Milling a high-alloy steel, for instance, a jet engine component manufacturer reports output jumped from 35 to 117 pieces per tool grind after Kutwell EP 66 replaced a high-cost specialty oil.

Machine lubrication—Kutwell EP 66 leaves an easy-to-see film of oil on the ways, cams and working parts of the machine tool for highly efficient lubrication.

Rancidity control — Kutwell EP 66 contains an effective bactericide selected by Esso Research to keep emulsions sweet smelling and serviceable for longer periods of time.

For special alloys and other tough machining jobs, Kutwell EP 66 will outperform conventional soluble cutting oils and many high-cost compounded mineral oils. An Esso representative will be glad to show where Kutwell EP 66 can do a better job in your operation.

Call the Esso office nearest you, or write: Industrial Lubricants Division, Esso Standard Oil Company, 15 West 51st Street, N. Y. 19, N. Y.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

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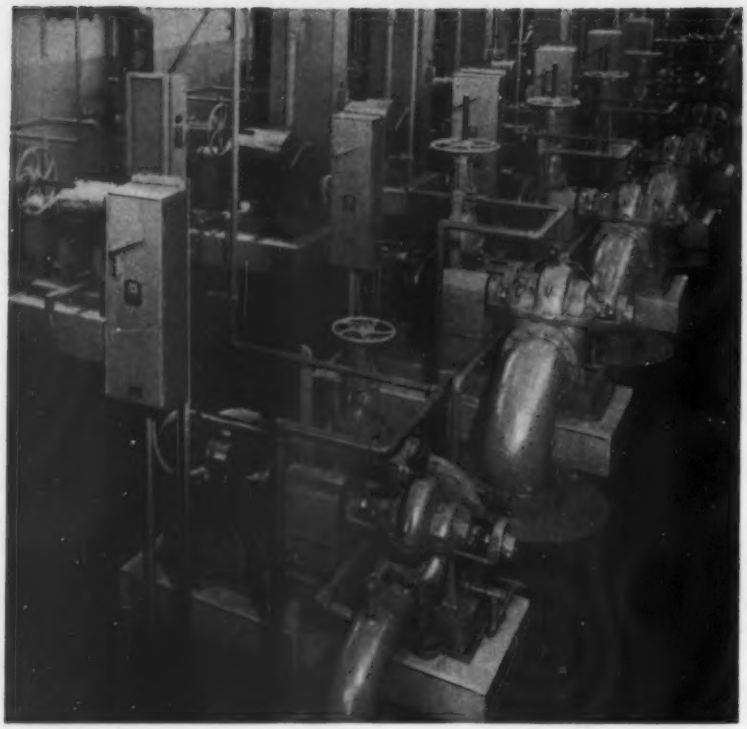

the bigger your pumping problems... the better your reasons for giving them to **WHEELER-ECONOMY**

Ford Motor Company's new Chicago Heights (Ill.) stamping plant had three big pumping problems, and Wheeler-Economy solved them all! Two Double-Suction Pumps keep the plant's reservoirs filled with a million gallons of water. Ten other W-E Pumps are used in Ford's recirculating process water system. And a pair of Double-Suction Pumps supply water for the company's space heating system.

C. H. Wheeler's Engineering Department, and production and test facilities, are all geared to the solution of one-of-a-kind pump problems. See your representative or write direct whenever you need pumps or expert pump advice.

Economy Pump Division

C. H. WHEELER MFG. CO.

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Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

For more facts circle 661 on Reply Card

You'll find two postage-free Reader Service Cards on pages 279-280. Use them for ordering product information — just circle item numbers of the catalogs or bulletins you would like to have. You may also use the cards for requesting advertising catalogs.

NEW PRODUCTS

(Begins on page 196)

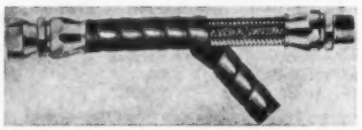
either type. Each of the four 12-by-12 in. vacuum cups has an area of about 130 sq in., averages 10 psi of vacuum pressure across its face. Where desirable, individual selector switches can be actuated to omit one, two or even all cups from the system. A built-in safety system acts to prevent vacuum release when the load is not resting on some solid surface. Vacuum force is such as to permit handling of individual cartons weighing 300 lb, according to manufacturer. The Yale & Towne Mfg. Co.

84—AIR DRILLS are small but powerful units

Triple O Drills are described as small, ¼ in. air drills having power and speed usually associated with drills twice their size. The drills weigh approximately 1½ lb and are just slightly longer than a fountain pen. They are available in five speeds, from 4500 to 500 rpm at 90 psi air pressure. Construction features announced include efficient muffling which reduces exhaust noise, alloy steel gearing supported by oversize ball bearings for maximum strength with minimum maintenance, and a three-jaw drill chuck designed to last the life of the drill. Tool is powered by five-vane air motor, and it comes with either lever throttle handle with suspension bail, or with pistol grip handle. Ingersoll-Rand Co.

85—PLASTIC COIL SLEEVE protects hose assemblies

This plastic coil sleeve is designed to serve as a protector for various hoses ranging in size from ¼ to 2 in. diam. Plastic sleeve for hoses up to ⅝ in. is supplied in coils up to 50 ft in length, and for larger hoses, in 25-ft



lengths. The sleeve is unaffected by air, water, oil, gasoline, and most other fluids, company says, including hydraulic oils. Besides protecting hose lines from abrasion, the plastic sleeve also insulates "hot" hose applications, such as steam-carrying lines, where metal braid of hoses might burn operators. It is said to retain its shape and flexibility from -20 to 200 F. It is wound onto hose. Aeroquip Corp.

Big warehouse keeps warm with four heaters

This 79,000 square foot warehouse of the C. A. Turner Company, Rankin, Pa., has high roof areas and large access doors. Yet, only four Dravo *Counterflo* heaters were needed to maintain a 68° comfort level during last January's severe cold spell with its frequent sub-zero temperatures. Fuel costs for the month were 7/10¢ per square foot!

More than 20,000 Dravo heaters, in use throughout the world, provide this same low cost heating in manufacturing plants, schools, commercial and public buildings. A factory-trained organization handles service on 24-hour call.

Are you paying for inadequate, obsolete or inefficient heating? A Dravo engineer will evaluate your present system now at no obligation. For information on this, or any of the other services and products pictured below, write DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

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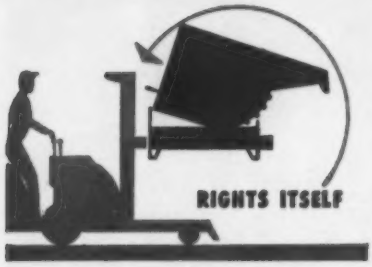
CORPORATION

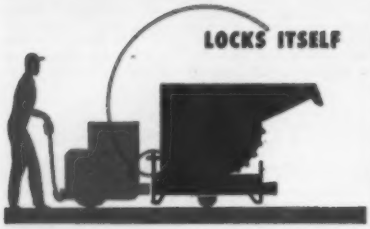
Blast furnace blowers • boiler & power plants • bridge sub-structures • cab conditioners • docks & unloaders • dredging • fabricated piping

foundations • gantry & floating cranes • gas & oil pumping stations • locks and dams • ore & coal bridges • process equipment • pumphouses & intakes

river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

For more facts circle 662 on Reply Card





Cuts handling time ...and costs...in half

Here's the fastest, lowest cost method ever devised for handling all kinds of bulk materials . . . hot or cold . . . wet or dry . . . such as:

Punch Press Parts . . . Cinders
Hot Forging or Castings . . . Scrap Metal
Pickles . . . Soybean Meal

A Roura Hopper fits any standard lift truck . . attached or detached in seconds . . can't slip off. One man does the entire job. Picks up loaded Hopper with lift truck . . . transports it to destination . . . flips the latch . . . and the Hopper automatically dumps its load, rights itself, locks itself. Cuts costs 50% or more.

They're sturdily made of heavy ¼" steel plate with continuous arc-welded joints. Five sizes from ½ to 2 yards capacity. Fitted with live skids or a choice of wheels. Standard models available for immediate shipment from stock. For special applications they can be made of stainless steel or galvanized.

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Self-Dumping
HOPPER

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ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Mich.

For more facts circle 663 on Reply Card

Button-Pushing Job?

(Continued from page 123)

mally open contact of this pressure switch is wired in series with the timer contact T-5 so that the clamps must be pressing against the beam before the circuit is completed to the hoist raising contactor.

A normally closed contact in this same pressure switch is wired in series with timer contact T-9 to make sure the clamps are fully released before the circuit is completed to the hoist raising contactor at time interval "nine."

Positioning of the punched beam over one of the five selected pockets is accomplished by a five-position selector switch which places a selected limit switch in series with the "jib-forward" and "hoist-lower" circuits. These limit switches are installed on the jib track.

A normally closed contact in each limit switch is wired in series with a position on the selector switch. The common terminal of the selector switch is wired in series with timer contact T-6 and then to the forward contactor of the jib motor. When the hoist has moved out over to the pre-selected pocket, the selected limit switch is operated and stops the jib motor.

A second, normally open, contact in the limit switch closes to complete a circuit through a second bank on the selector switch, through timer contact T-7 to the "hoist-lower" contactor. This circuit is designed to prevent lowering the hoist unless it has positioned properly over the selected pocket. **End**

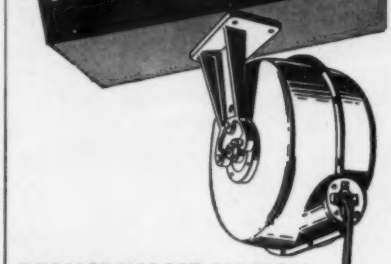
Polyurethane—Modern Tool

(Continued from page 128)

cracks and wall openings. The job required 1000 lb of the polymer . . . at a total cost of but $2000.

Re-insulation of Sunkist's freezing tunnel at its Lemon Products Division was a typical . . . though a more complex job. About 5260 lb of polyurethane were used to foam approximately 1200 cu ft of the 84 by 20 by 21 ft room. Allowing for weight loss and inevitable spillage, an average density of 3.5 lb per cubic foot was achieved. A K factor of 0.14 was engineered into the job through addition of liquid Freon to the formula. **End**

BOOST WORKER EFFICIENCY with WAYNE HOSE REELS



REDUCE WASTE MOTION
CUT HOSE COSTS
IMPROVE SAFETY

Get more production per worker with Wayne Retriever Hose Reels . . . engineered to reduce wasted motion. Easily installed . . . easily reached—overhead, underbench, floor or beside bench —Wayne Hose Reels have proved themselves "production boosters" in all types of plants.

Wayne Hose Reels work like a window shade. Ratchet holds hose at any desired length. Slight pull on hose releases catch and hose rolls back automatically to pre-determined setting. Ruggedly built for hard continuous use.

Write for technical data and folder to . . .

THE WAYNE PUMP CO.
Industrial Division-Fort Wayne 4, Ind.
Division Symington Wayne Corp.

Wayne
HOSE REELS

For more facts circle 664 on Reply Card

SHOP ASSEMBLED

in a single package

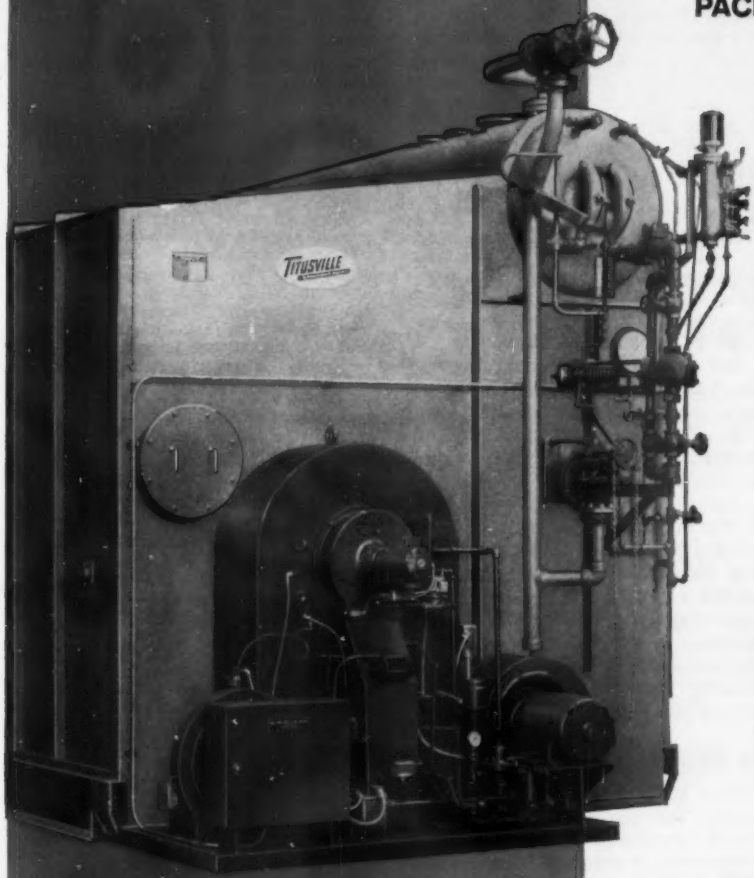
READY FOR SERVICE

as soon as connected

Versatile and efficient in operation

TITUSVILLE TYPE WTP

PACKAGE STEAM GENERATOR



This is the modern water-tube steam generator that is *packaged to serve you better*—easy to transport due to compact size, ready to operate soon as service-connected, and adapted for firing with heavy oil; combination heavy oil and gas; light oil; combination light oil and gas; natural gas; manufactured gas; and coke oven gas. The Titusville Type WTP requires no high stack or induced draft fan, is ruggedly automatic-welded throughout, meets latest ASME code requirements, and offers wide choice of full or semi-automatic control arrangements. Let a TITUSVILLE Engineer discuss your steam generator needs, soon!

Write for your copy of the latest Type WTP Steam Generator folder, plus complete specification data.

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THE TITUSVILLE IRON WORKS CO.

TITUSVILLE, PENNSYLVANIA

BOILER DIVISION: BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units. **PROCESSING EQUIPMENT DIVISION:** Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters. **FORGE DIVISION:** Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

Manufacturers of A Complete Line of Boilers for Every Heating and Power Requirement

Plants at Titusville, Pa. and Warren, Pa.

Offices in Principal Cities

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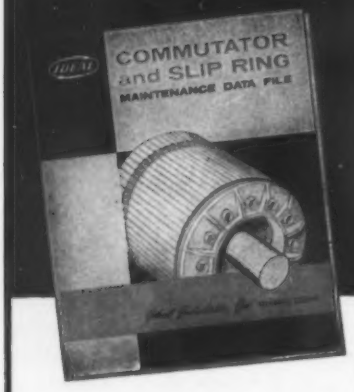
FREE

NEW SERIES

HOW-TO-DO-IT ARTICLES

on Commutator and Slip Ring Maintenance



Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

Designed as useful refresher reading and trouble shooting guidance for the veteran maintenance man . . . and a must for the new man just "breaking in" . . . the entire series has been prepared in close consultation with leading, nation-wide engineering authorities.

Mail the coupon for Article No. 1 now. Don't miss it — the remainder of the series will be sent to you at regular intervals, free and without obligation.

IDEAL Preventive Maintenance
Everything in equipment and methods for Commutator and Slip Ring Maintenance.

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For more facts circle 666 on Reply Card

NEW BOOKS

for the plant engineer

Powder-Driven Fasteners

POWDER-DRIVEN FASTENER HANDBOOK. Size 11 by 8¾ in. approx; 48 pp; illustrated; paper bound with plastic edge. Published by Winchester-Western Div., Olin Mathieson Corporation, Cleveland 11, Ohio. Price $2.00.

IF YOU HAVE only casually looked into powder-driven fasteners and are generally familiar with them, this well illustrated, easy to read publication may be of help to you in learning a good bit more about them. Beginning with a brief general discussion on this type of fasteners, the handbook continues with a presentation of various types, fastening systems, properties of Ramset systems, advantages, and specifications. Many kinds of applications follow. The booklet also includes information on design loads and fastener tests, and a glossary of technical terms.

Industrial Relations

WHAT EVERY SUPERVISOR SHOULD KNOW by Lester R. Bittel. Size ¼ by 6¼ in.; 451 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $7.95.

THE AUTHOR of this book discusses the handling of people, managing them and other topics of supervisory interest. This is done through 700 questions and answers. Case studies are also included.

Among the specific subjects covered in the book are the following: appraising employee performance, winning employee cooperation, handling gripes and avoiding grievances, improving work methods, shop housekeeping, how to hold group discussions and lead conferences, understanding business economics, and writing for business.

On Metal Peening

SHOT PEENING. Size 9 by 6 in. approx; over 190 pp; illustrated; cloth bound. Published by Wheelabrator Corporation, Mishawaka, Indiana. Price $2.50.

SHOT PEENING — what it is and what it can do for metals—is discussed in this book. Shot peening equipment and its application in industry is also taken into account in the first part of the book.

In the second principal portion of

ADAMS FACT FILE #3

INSTRUMENT AIR

Clean Dry Air Supply Will Reduce Production Down-Time . . . Instrument Maintenance . . .

Wet, dirty compressed air has no place in the process industries. In instrument air supply lines it can cause havoc. Whether it be motor air in a control circuit or supply air to the control panel, absolutely clean dry air is vital. Moisture elimination is the major consideration in providing suitable air for instrument and control systems.

Since most plant compressors in use today are oil lubricated, a finite amount of oil is present with the water vapor in the discharge. This carry-over condenses as an oil-water emulsion which often causes serious fouling of instrument components. To eliminate this oil-moisture condensate in the air lines, it is necessary to remove it before it reaches the distribution system. This is done by cooling the air before the receiver. It is advisable to cool well below the ambient conditions to provide the lowest possible humidity at the instrument panel or control units.

Two Stage System Design for Economy

The ideal method to achieve high quality air is a two-step operation.

1—An Adams Aftercooler . . . providing 2° F. cooling . . . and Cyclone Separator installed between the compressor and receiver to remove the bulk of moisture carry-over.

2 — A chemical dryer installed down stream to provide the polishing action necessary for the desired minimum humidity.

Thus, the bulk of water . . . 90% . . . is removed by the Aftercooler-Separator using plant water for cooling. A minimum moisture load is then left to be removed by more expensive methods. Under normal circumstances, all of the oil present in the compressor discharge will be removed in the Aftercooler-Separator. Fouling of the chemical unit is then virtually eliminated.

Poro-Stone Air Filter at Panel Provides Dirt-Free Control Air . . .

In spite of the efficiency of the Adams Aftercooler and Separator, there still will be some dust and dirt present in the instrument air system. That's why it is advisable to install an Adams Poro-Stone Air Filter in the line just before the control panel.

Separation by the Adams unit is in two stages — centrifugal and diffusion. Centrifugal force throws the foreign matter to the walls of the filter body where it is trapped in slots and drained. Remaining particulate matter is removed as the air passes through the pores of the Poro-Stone element.

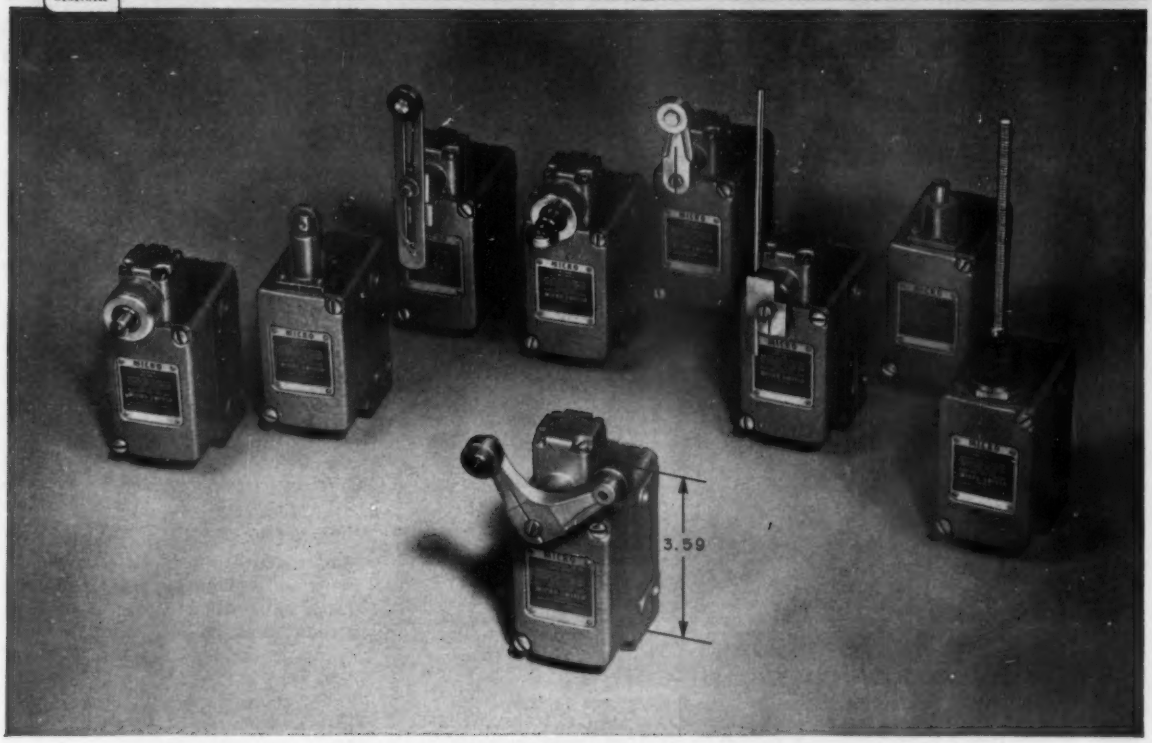
This final protection for your instruments will minimize control system failures and process down-time. Instrument maintenance will be sharply reduced.

Literature Will Help Air System Design

For further information on how the complete line of Adams air equipment can help you provide a foolproof instrument air supply, write today for your copy of Bulletin No. 712 on Aftercoolers and Separators and Bulletin No. 117 on Poro-Stone Air Filters to the R. P. Adams Company, Inc., 254 East Park Drive, Buffalo 17, New York.

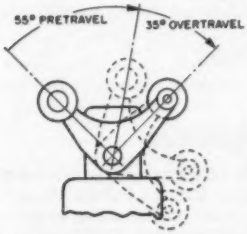
For more facts circle 667 on Reply Card

MICRO SWITCH Precision Switches



New "Plug-in Limit" switch ... now there are nine

Here is a new "Plug-in Limit" switch with yoke actuator—the ninth in the famous "200LS" Series. The yoke is adjustable to any position on the shaft through 360°, and the operating head mounts in any of four positions. The new 206LS1 is a maintained contact switch.



"200LS" Series switches have found ready acceptance as limit switches for control of lathe carriages, grinders, table feeds, drilling and tapping equipment, automated machinery, etc.

"Plug-in Limit" switches plug into the terminal enclosure like a radio tube and can be replaced in seconds, practically eliminating costly downtime. They are rugged, reliable, and completely sealed against oil, water, dirt and dust.

Contact arrangement is two-circuit double-throw.

Electrical rating is: 10 amps, 120, 240, 480 vac; ½ hp, 120 vac; 1 hp, 240 vac; 0.8 amp, 115 vdc; 0.4 amp, 230 vdc; 0.1 amp, 550 vdc. Pilot duty rating is 600 vac max. Meets NEMA Industrial Control standards.

For details of the "200LS" Series, write or call the MICRO SWITCH *branch office or authorized distributor near you. Consult the Yellow Pages.*

MICRO SWITCH ... FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

For more facts circle 668 on Reply Card

INCREASE PRODUCTION

with New SUN-X Glass Tinting

Now you can economically protect your employees from the dangerous, fatiguing effects of the sun's strong rays... provide comfortable working light... and help prevent mistakes and accidents.

New Sun-X Glass Tinting, a liquid plastic development by Du Pont, makers of "Better Things For Better Living... Through Chemistry," gives you positive, all-day sun control. Laboratory tests prove conclusively that Sun-X can eliminate up to 95% of the light rays causing glare.

New Sun-X Glass Tinting is applied quickly and neatly to your existing windows by a unique miracle-flow process. It bonds tightly and is *guaranteed in writing* not to chip, crack or peel. No maintenance is required – you wash Sun-X tinted windows in the usual manner.

Available in your choice of 11 distinctive colors, Sun-X Glass Tinting gives you the distortion-free appearance, the trouble-free convenience of expensive factory-tinted glass *at a fraction of the cost.*

To see how Sun-X can more than pay for itself in increased production, send now for your free copy of "Solve Sun Problems with Sun-X."

SUN-X DUPONT MANUFACTURED BY DU PONT

International Distributors

AMERICAN GLASS TINTING

CORPORATION

4125 RICHMOND AVE. • HOUSTON, TEXAS

For more facts circle 669 on Reply Card

NEW BOOKS

this informative publication is a contribution by F. H. Moore, Research Professor of Engineering Materials, Emeritus, University of Illinois.

Reprints of trade journal articles appear in the next two parts; their titles are, "Improving Fatigue Strength of Machine Parts," and "Mechanical and Metallurgical Advantages of Shot Peening."

A glossary of technical terms is also included in the book.

Power Plant Technology

POWER PLANT THEORY AND DESIGN by Philip J. Potter. Size 9¼ by 6¼ in.; 710 pp including index; illustrated; cloth bound. Published by the Ronald Press Company, 15 East 26th St., New York 10, N. Y. Price $10.50.

ALTHOUGH this book is slanted for those interested in power plant operations and equipment, its contents include information of use to those in industrial activities. Basic material found in the book applies to industrial plant utility equipment.

Of course, subjects like gas turbines, nuclear plants, hydroelectric plants are outside the sphere of plant operation; however, it may be well for engineers in industry to know something about them, if anything, to expand their knowledge.

There are 16 chapters in this nicely illustrated publication. Some of these are as follows: flow of fluids; fuels and combustion; steam generators; heat balances; pumps; and steam turbines.

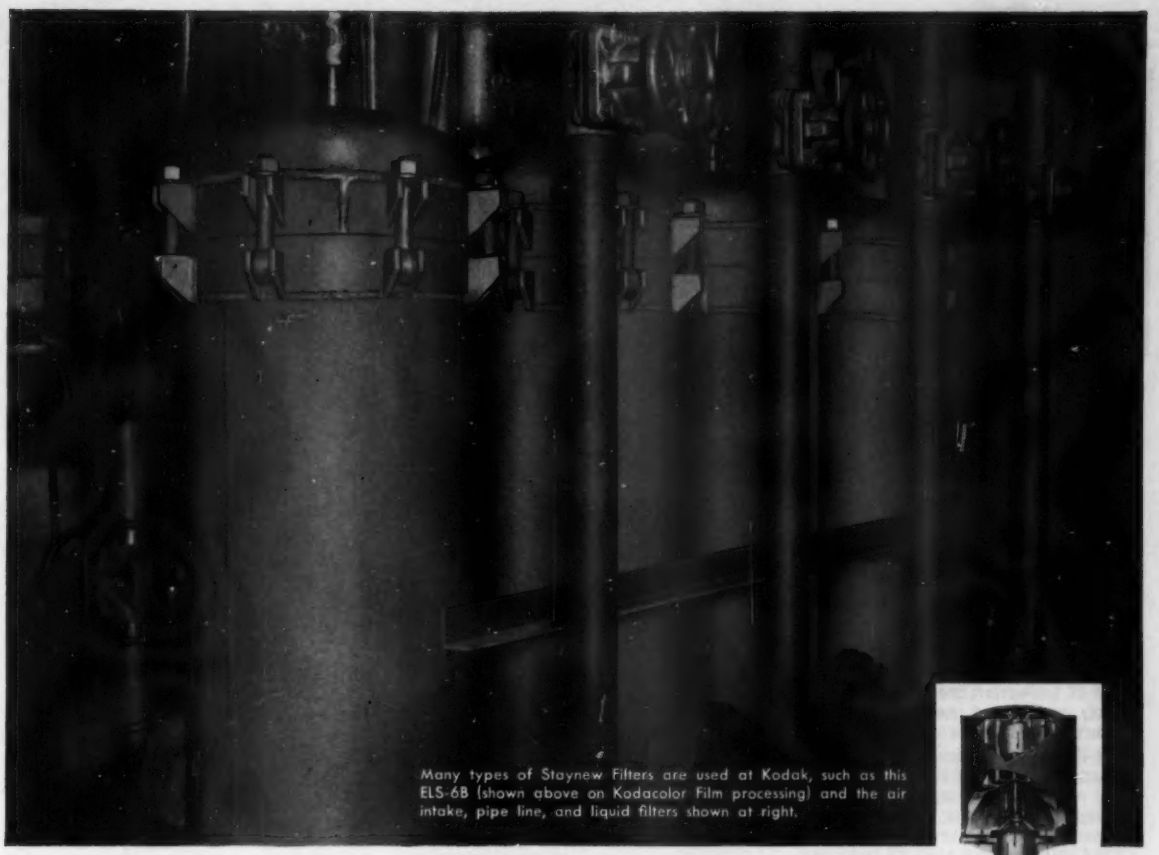
The appendix includes tables which give the physical properties of various schedules of pipe. There are twenty subjects treated in this section.

On Organization

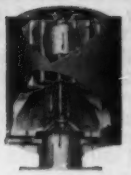
ENGINEERING AND ORGANIZATION by Everett Laitala. Size 9¼ by 6⅛ in.; 391 pp including index; illustrated; cloth bound. Published by Richard D. Irwin, Inc., Homewood, Illinois. Price $7.20.

AT THE BEGINNING OF this book the author discusses the basic philosophy of engineering which pertains generally to various branches of this profession. Later he delves into the steps that go into the evolvement of the engineering process and also the six steps of the engineering method for handling problems.

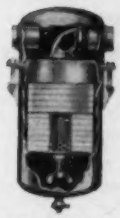
The book not only deals with the various functions that may enter into the over-all picture of turning out prod-



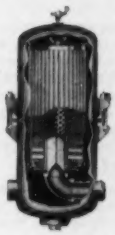
Many types of Staynew Filters are used at Kodak, such as this ELS-6B (shown above on Kodacolor Film processing) and the air intake, pipe line, and liquid filters shown at right.



Air Intake Filter (Bulletin 100)



Pipe Line Filter (Bulletin 200)



Liquid Filter (Bulletin 300)

Staynew Filters Help Maintain Quality through cleanliness at Kodak

In film making, cleanliness is one of the important factors affecting quality. That's why, at Eastman Kodak in Rochester, production areas are scrubbed frequently, white sanitary uniforms are worn, and Staynew Filters are used to cleanse compressed air and water piped to vital machines and processes.

At the Kodak Park Works, films, papers, and chemicals are made. Here, on film-casting machines, personnel wear masks at certain times to protect themselves from toxic fumes; Staynew Filters keep out oil, dirt, and water from the compressed air that goes to the masks. Staynew Filters supply clean air to pneumatic instruments, controls, and cylinders used in film casting and other operations. And, Staynew Liquid Filters protect both equipment and film in the critical processing of Kodacolor Film.

At Kodak's A. & O. Division (Hawk-Eye Plant), which makes lenses and other precision optical equipment, Dollinger filters clean the air used on pneumatically-driven drills, cylinders, hoists, and blow guns. Dollinger's responsibility is an important one—dust lodged in an expensive lens assembly, for example, can cause the assembly to be rejected.

Kodak uses Staynew Filters for several good, sound reasons. Staynew's Radial Fin Construction provides the greatest active filtering area possible for available space—it maintains low velocity and unusually low resistance to flow. Filter elements, available in any material, are simple and inexpensive to replace. For cleaning and inspection, complete access to the interior is possible by merely removing wing bolts.

Dollinger has a filter for every need, whether it's film processing or a hundred and one other jobs. Proper filtration depends on many factors —material, temperature, pressure. Your best bet is to consult a Dollinger representative—he'll be glad to work with you on application problems. Or, send for the Bulletins described. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

REG. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW **DOLLINGER**

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 670 on Reply Card

New Way to Stop Faucet Leaks!

★ 9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.

★ NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.

★ Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

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SEXAUER

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NEW BOOKS

ucts but also defines the principles of organization. It also contains information on the various types of organizational structures; illustrations of sample organizational arrangements are included.

Some of the basic functions treated in this book pertain to the following topics: budget; product design; production; buying; selling; and maintenance. The appendixes' portion includes definitions of engineering, factors for the preparation of specifications for engineers.

Steel Making in the U.S.S.R.

STEEL IN THE SOVIET UNION. Size 9¼ by 6¼ in.; 376 pp; cloth bound. Published by American Iron and Steel Institute, 150 East Forty-second Street, New York 17, N.Y. Price $5.00.

LAST YEAR a delegation of Americans made an exchange visit to the Soviet Union; members of the delegation observed steel making and iron ore mining operations. This book carries a report of the visit. The itinerary of the delegation and dates is presented at the beginning of the book.

The main portion of the book is presented in six parts having titles as follows: general information about the delegation's visit; raw materials; blast furnace facilities and practices; soviet steelmaking facilities and practices; soviet rolling mills and rolling practice; management-labor relations.

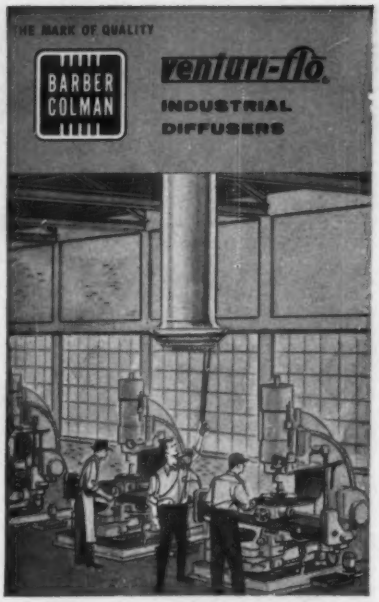
Dimensional Control

DIMENSIONAL CONTROL IN PRECISION MANUFACTURING by John L. Gadzala. Size 8⅝ by 5¾ in.; 203 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $7.50.

FUNDAMENTALS and methods for production machining are discussed in this book which covers dimensioning and dimensional tolerances. Early steps in planning a production machine sequence of operations for a piece part are clearly outlined.

Dimensions and tolerances in special applications are presented and a detailed account of production operation process sheets for machining a part. The important subject of a tolerance evaluation by the method of traces is also treated.

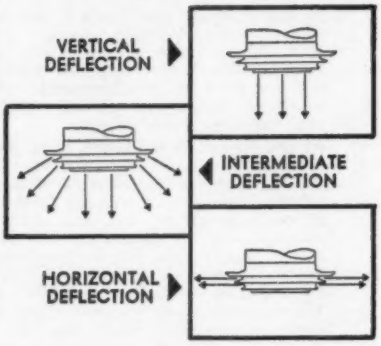
The book's contents include step by step instructions for the construction of a tolerance chart and examples of that type of chart.



Fresh air at working level improves employee efficiency

Barber-Colman Model BP Venturi-Flo industrial diffusers permit air to be piped down to working level. This prevents stagnant, smoky air which has collected near the roof, from being mixed with the incoming fresh air. The contaminated air is readily expelled by roof exhaust fans. Employee comfort and efficiency are measurably improved.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while



during cool evenings, or in cold weather, the air should be diffused above the head of the worker, providing adequate ventilation, but eliminating cold drafts.

A complete range of sizes is available to meet any industrial requirement. Get complete information in Bulletin F7722-1 — performance data, installation diagrams, and dimensions. Call your Barber-Colman field office or write:

BARBER-COLMAN COMPANY

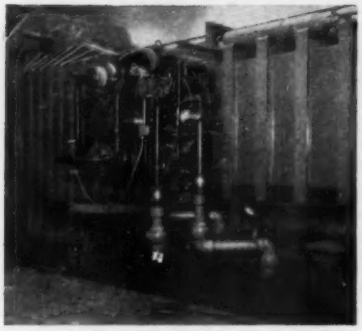
Dept. U, 1139 Rock Street, Rockford, Illinois

For more facts circle 672 on Reply Card

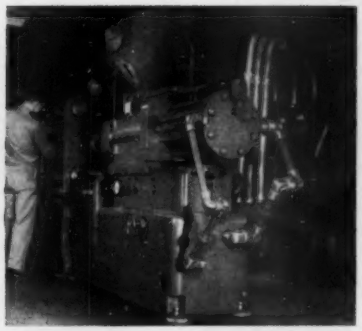
ON EQUIPMENT LINES ■

CHIKSAN SWIVEL JOINTS

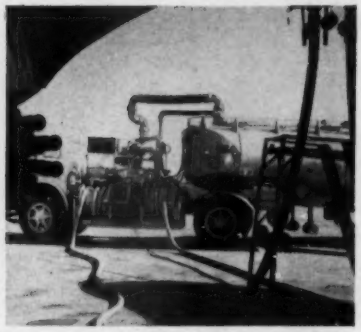
team up strength + flexibility + endurance...



QUICK DISCONNECT FOR A SUPERSONIC WIND TUNNEL—On lines that require frequent disconnecting, such as on this wind tunnel, Chiksan swivel jointed assemblies, teamed with Weco Unions, disconnect quickly, swing out of the way and then back into perfect alignment. **For application details, request report 008.**



0 TO 2000 PSI IN ONE SECOND—injection molding machine lines must be flexible. Safety is a must. Endurance highly desirable. Chiksan Swivel Joints not only fulfilled these important requirements but their savings in replacement cost soon paid for the swivel joints. **For applicable details request report 001.**

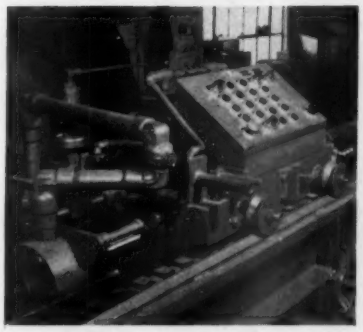


SAFETY LINK FOR JET-FUEL DELIVERIES—In design of trailer tankers for fueling jet aircraft one danger point was the suction line from pump to the trailer. By employing Chiksan Swivel Joints desired flexibility was maintained and the danger of kinking was eliminated. **For application details request report 006.**

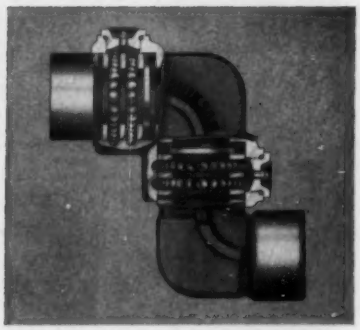
When moving machine parts cause tight bend or twist on hose lines, Chiksan Swivel Joints are a ready solution. Or when your design dictates the use of flexible metal lines, Chiksan Swivel Joints allow controlled flexibility. Whenever line endurance, strength and flexibility are desired Chiksan Swivel Joints may offer a ready solution.

Chiksan Swivel Joints with their infinite service life, full 360° rotation and high safety factor, quickly pay for themselves by minimizing hose replacement and by eliminating costly line failure, fluid loss and downtime. For expert advice on your line design problems contact Chiksan. A nearby representative will call, analyze your requirements, and make specific recommendations.

Send for illustrated literature ➡



ON THE MOVE 24 HOURS A DAY—Every five seconds right around the clock this machine tests finished pipe with water under pressures up to 1000 psi. Line movement is almost continuous. The solution. For safe, flexible lines of maximum endurance—Chiksan Swivel Joints. **For application details request report 010.**



DESIGN WITH SWIVEL JOINTS—Over 2,000 different types, sizes and styles give you an excellent selection of swivel joints for your design application.

CHIKSAN COMPANY, 330 North Pomona Ave., Brea, California

☐ Please send me your latest General Catalog
Please send me product application report ☐ .001 ☐ .006 ☐ .008 ☐ .010

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Company_____ Title_____

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#59-45

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A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY—Brea, California • Chicago 5, Ill. • Newark 2, N.J. • Weco (Division), Houston 24, Texas • Subsidiaries: Chiksan Export Co. • Chiksan of Canada Ltd.

For more facts circle 673 on Reply Card

INDUSTRIAL FILMS

Fluid Control Equipment

A NEW 16 mm colored film entitled "Muscles of Control" shows in simple pictorial style, how control valves function and how they are engineered. Various types of power actuators from pneumatic to electro-hydraulic are demonstrated. Special camera and animation techniques were used to reveal what happens inside the valve body under normal and extreme operating conditions.

Phenomena such as cavitation and turbulence are also clearly shown and explained, as well as the effects of corrosion and erosion on plugs and seats. Bookings for the film, which runs 25 minutes, are being scheduled for universities, engineering societies, manufacturers in the process industries, and other technical groups who have an interest in control equipment. Requests should be addressed to the Fisher Governor Company, Marshalltown, Iowa, or to any Fisher representative. There is no charge for its use.

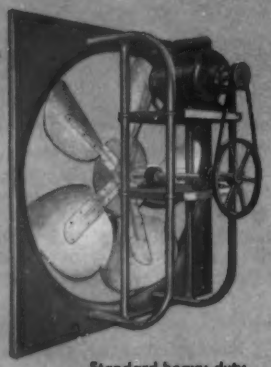
VP-EX PROPELLER-TYPE

belted roof ventilator

Self-contained VP-Ex belted roof ventilator

The outstanding performance of the VP-Ex Belted Roof Ventilator is derived from insistence on quality at every step—from its galvanized construction through its complete industrial-type propeller fan. Capacities from 4450 CFM to 33900 CFM; also available in smaller direct drive sizes.

Send for Bulletin 582.



Standard heavy-duty type belted propeller fan

nyb THE NEW YORK BLOWER COMPANY

SALES OFFICES: 3163 S. SHIELDS AVENUE • CHICAGO 16

For more facts circle 674 on Reply Card

Safety Is People

SAFE JOB PERFORMANCE in portland cement manufacturing plants is the subject of a new 16 mm sound and color motion picture.

Entitled "Growing Pains," the film's 33-minute story emphasizes the importance of a mature attitude toward safety among plant workers.

The central figure is a worker who learns from the example of his 11 year old son a lesson in growing up to his responsibilities for safe conduct. By digging deep into the human rather than the mechanical causes of accidents, the story brings out the safety value of teamwork, observance of rules and instructions, discipline and due regard for consequences.

"Growing Pains" is available from Portland Cement Association, 33 West Grand Avenue, Chicago 10, Ill.

Mechanized Boxcar Unloading

ACTUAL operation of mechanized grain car unloading equipment is shown in this 14-minute, 16 mm sound color film entitled "Handling the Harvest."

One of the two boxcar unloaders is the massive tilting type grain car unloader. It tips cars 40 degrees on end and 15 degrees sideways and can unload ten boxcars in an hour. The other is the Kar-Flo, which unloads up to six cars per hour by means of an oscillating motion.

Available without cost, on letterhead request for showing in the U. S., this film may be obtained from the Public Relations Department, Link-Belt Company, Prudential Plaza, Chicago 1, Illinois.

High Pressure Hydraulics

A NEW 16 mm sound color film on the advantages of axial piston pumps in high pressure hydraulics entitled "Design for Power" is now available.

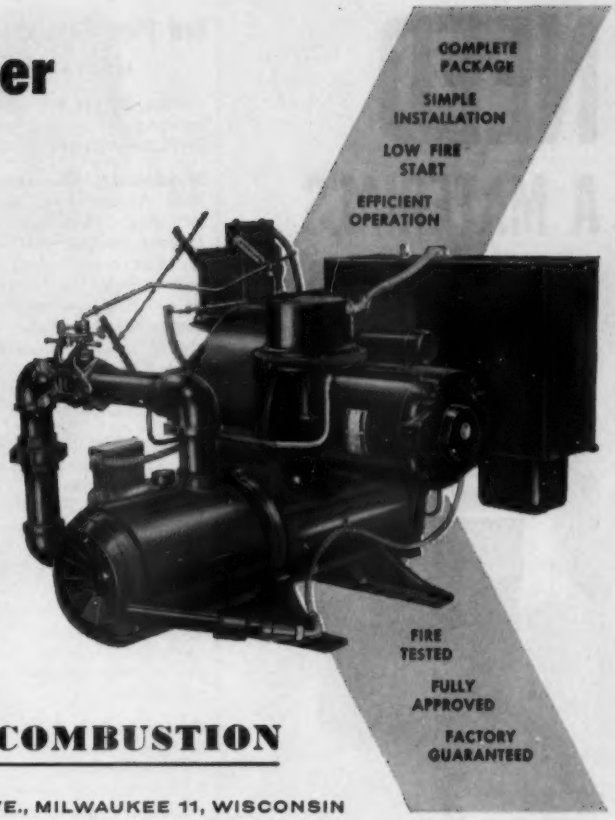
Analyzed in the film are the advantages of axial piston pumps on heavy-duty press equipment, mobile machinery, ground support and marine power systems at pressures up to and above 5000 psi. Running time of this interesting film is 18 minutes.

Descriptive folder and order blank may be obtained from Denison Engineering Division, American Brake Shoe Company, 1160 Dublin Road, Columbus 16, Ohio.

Low cost gas burner outstandingly efficient at all flame settings

Precision-engineered commercial-industrial Hev-E-Duty power gas burners are the low-cost answer to high heating efficiency with gas. Automatic electric ignition assures safe starting. Built-in low fire start that builds up slowly to the flame size required means smooth, safe operation. Minimum low fire and maximum high fire can be controlled exactly for top efficiency with any boiler or furnace.

Once set, the burner maintains this setting automatically regardless of weather. Sizes from 720,000 to 21,000,000 BTU. Hev-E-Oil and combination gas/oil models also available. For more information write Industrial Combustion, Inc., 4507 N. Oakland Ave., Milwaukee 11, Wis., Dept. PE-959.



INDUSTRIAL COMBUSTION INC.

EXECUTIVE OFFICE: 4507 N. OAKLAND AVE., MILWAUKEE 11, WISCONSIN

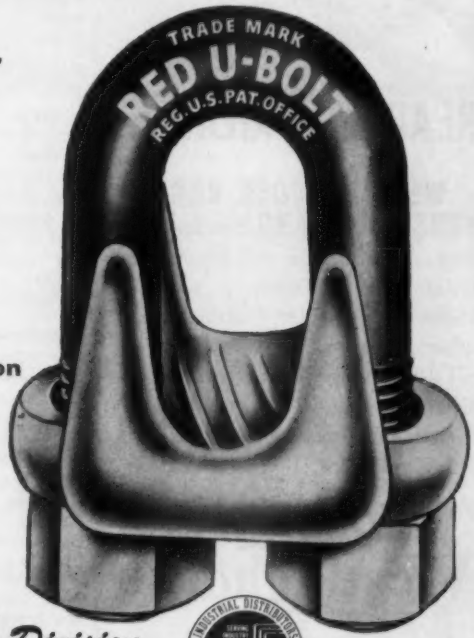
For more facts circle 675 on Reply Card

For SAFER wire rope fastenings . . .

GENUINE CROSBY WIRE ROPE CLIPS

Red-U-Bolt* for instant recognition

- **Drop forged base**
- **Base grooved to fit rope**
- **Hot-dip galvanized . . resists rust and corrosion**
- **Standard heavy hex nuts**



Write for free specifications catalog listing the most complete line of drop forged fittings for wire rope and chain.

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BE SURE TO SPECIFY
The Genuine CROSBY CLIP

Stocked by leading distributors everywhere.

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FT. WAYNE, INDIANA

- **Proved in 75 years of service**
- **The Standard of the industry**
- **The only clip line in size range from 1/8" thru 3"**

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NEED A MATERIALS HANDLING FAN?

READILY AVAILABLE:

WESTINGHOUSE RUGGED, VERSATILE FANS for handling dust, chips, grains and fibrous materials in any process . . . also in a variety of types for ventilation and other processes.

Call your nearest Sturtevant Division Sales Engineer—or write Westinghouse Electric Corporation, Dept. J-5, Hyde Park, Boston 36, Mass.

J-80690

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Hyde Park, Massachussets; La Salle, Illinois; Berkeley, California.

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

For more facts circle 677 on Reply Card

New Plant Construction

(Continued from page 168)

duction by the fall of 1960. Plant with building site is reported to represent an investment in excess of $2 million.

Middletown, O.—Armco Steel Corp., 1939 Armco Ave., this city, is constructing a building to house a continuous coating unit used for producing zinc coated steel sheets. Program will include the conversion of one of its existing zinc coating units at local works for the production of aluminum coated sheets and coils. The new 565-ft long production line will almost double plant's current capacity for production of coated sheets.

Philadelphia, Pa.—Philco Corporation, 445 E. Tioga St., this city, plans to construct a plant on a 72-acre tract adjoining the Pennsylvania Turnpike. Ground for the new 200,000-sq ft facility has just been broken and when completed in early 1961 will cost a reported $3 million. The plant, an expansion of company operations in this area, will produce various military electronics components as well as supply regular production needs of the corporation.

Greenwood, S. C.—Chemstrand Corp., Decatur, Ala., plans to construct a multi-million dollar plant for the manufacture of nylon yarn. Plant will be erected on a 1400-acre site about six miles northeast of here and work on the structure is already under way. Completion is scheduled for early 1961 when capacity for 10 million lb of nylon yarn will be available.

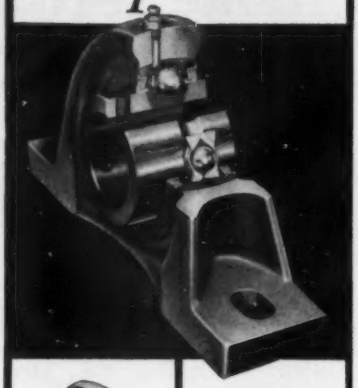
Sunray, Texas—Shamrock Oil & Gas Corp., Amarillo, Texas, plans to construct an 8000 bbl-a-day catalytic cracking plant unit at company's McKee Refinery located here. Construction of the facility will begin soon under supervision of the Fluor Corp., Ltd., 2500 S. Atlantic Blvd., Los Angeles, Calif., and is scheduled for completion by the summer of 1960. Cost of the new facility is reported to be in excess of $1 million.

Vancouver, Wash. — National Can Company, 3219 W. 47th Place, Chicago, Ill., will occupy a 125,000-sq ft canning plant now under construction for the company by the Port of Vancouver Authority in Vancouver, Wash. Plant when completed later this year will have a capacity of 150 million cans per year which will be used for the packing of fish, fruit, vegetables and beer.

Menasha, Wis. — Menasha Woodenware Corp., 440 River Street, plans to construct a pulp and paper mill in the Coos Bay area in Oregon. Plant will have an initial capacity of 100 tons of pulp per day and will represent an investment of approximately $5 million. Work on the new project will begin soon, on a schedule calling for completion by early 1962.

SEALMASTER

...quality that builds acceptance!



"LP" PILLOW BLOCK

RUBBER-MOUNTED PILLOW BLOCK

There is no greater assurance of performance than quality. SEALMASTER gives you that quality in a complete line of ball bearing units, providing a wide range of mountings in shaft sizes from 1/2" to 4 15/16".

The new SEALMASTER "L" Series provides a precision, low-cost line of self-aligning ball bearing units.

SEALMASTER rubber mounted units provide extremely quiet operation where noise is an important factor.

Whatever you look for in a bearing unit—quality—performance—economy—there's nothing comparable with SEALMASTER!

WRITE FOR CATALOG 454

SEALMASTER

SEALMASTER BEARINGS
A DIVISION OF
STEPHENS-ADAMSON MFG. CO.
89 RIDGEWAY • AURORA, ILL.
PLANTS LOCATED IN: LOS ANGELES, CALIF. CLARKSDALE, MISS. • BELLEVILLE, ONTARIO

For more facts circle 678 on Reply Card

Processing belts must withstand destructive forces that ordinary conveying belts never encounter.

When processing is your problem . . . specify
Wissco Woven Wire Belts

There are two general categories of belts. First, belts that merely *convey* products from one place to another under normal conditions. Second, belts that are an integral part of a *process*—where conditions exist such as heating, sudden cooling, corrosion, abrasion, or circulation of gases or liquids. For ordinary conveying, many types of belts will fill the bill. But for processing, just any belt won't do—a *woven wire belt* is the best answer. Here's why Wissco Woven Wire Belts meet your processing requirements:

1. Wissco Belts have an **open mesh**—permitting free circulation or drainage of air, liquid or gases. Corrosive liquids do not stay on the belt. And the open mesh allows rapid and efficient heating or cooling of the product conveyed.

2. Wissco Belts are made of **steel**—plain, tinned, galvanized, stainless or special alloy—to meet temperature extremes, corrosive or abrasive conditions, or operational wear.

3. Wissco Belts are **pretested**, including furnace testing if required, without cost to you. You know your Wissco Belt has operated correctly before you get it.

You also get these Wissco services: belts washed and degreased before shipment, then shipped on a reel (no charge for the reel). A Wissco reel, often replacing several packing crates, saves you freight and handling charges, and makes installation quicker and easier.

Your Wissco Belt engineer is always available to help with your belt installation or operating problems. Contact the CF&I office nearest you today.

WISSCO BELTS
THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Denver and Oakland
In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta · Boston · Buffalo
Chicago · Detroit · New Orleans · New York · Philadelphia 7085

For more facts circle 679 in Reply Card

PUT

IDEAL Performance

into your

PUMPING

for greater

EFFICIENCY

and **ECONOMY**

VERTICAL
Hollow or Solid Shaft
MOTORS

a. Small Vertical 15-125 HP
b. Large Vertical 150 HP and Up
c. NEMA II Weather Protected

From top to bottom, IDEAL Vertical Motors are engineered for maximum ease and economy of installation, operation and maintenance. A few of the outstanding features include:

- cast-aluminum drip covers
- non-spilling drain plugs
- flush mounted oil sight gages
- standard or special mounting bases
- thrust bearings sized to each application.

IDEAL Vertical Motors are available in a wide range of HP ratings with enclosures and insulations to meet all environmental conditions. Consult IDEAL for Vertical Motors built to your most exacting specifications.

Ask for Bulletin 212 (15-125 HP) and Bulletin 219 (150 HP and larger)

The IDEAL ELECTRIC & MANUFACTURING CO.

302 East First St. Mansfield, Ohio

SINCE 1903, AMERICA'S FINEST MOTORS, GENERATORS, MOTOR-GENERATOR SETS, SWITCHGEAR AND CONTROLS.

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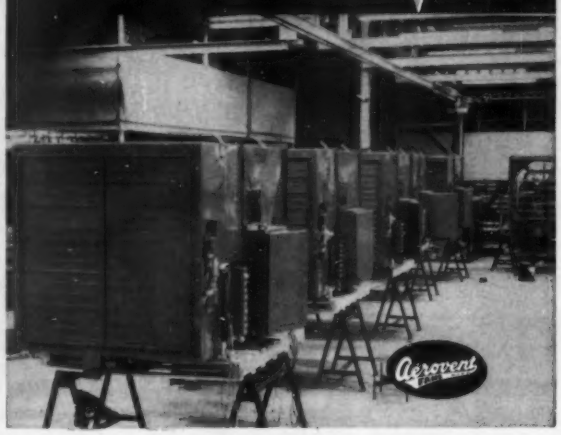
increase production capacity . . .
improve fan and heating efficiency

with

gas-fired air make-up units



Pictured above is a portion of the final assembly line at Aerovent showing 8 units slated for delivery to a large Midwestern automobile accessory manufacturing plant. Designed to supply ample quantities of clean, pre-heated or cool, outside air to replace air exhausted by ventilating systems, the Aerovent Gas-Fired Air Make-Up Unit keeps air fresh; eliminates drafts and negative pressures. Safe, dependable operation and automatic, semi-automatic or manual control with natural, mixed, manufactured or propane gas.

For winter or summer use, these compact, packaged units are available in four unit arrangements and four sizes from 36" to 54" for various capacities, BTU ratings and pressure conditions.

Write for bulletin 880.

OTHER UNITS AVAILABLE FOR STEAM OR HOT WATER

Air deliveries of all Aerovent equipment are tested and rated in accordance with established and accepted codes and each unit is guaranteed by the manufacturer to deliver its rated performance.

CERTIFIED PERFORMANCE

Aerovent

FAN COMPANY, INC.

ASH AND BOND STREETS • PIQUA, OHIO

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BULLETINS

(Begins on page 25)

145 **Pressure Treated Wood**—Benefits to be derived from use of pressure treated lumber for construction, process industries, and other building purposes are outlined in this 16-pp bulletin. When and where to specify pressure treated lumber is discussed and typical applications are illustrated and described. Wood Preserving Div., Koppers Co., Inc.

146 **Aluminum Windows**—Features and advantages of a line of aluminum projected windows are illustrated and described in 20-pp Catalog A-59. Specifications are included, as well as photos, layout diagrams, schedule data, and suggested arrangements. The William Bayley Co.

147 **Flooring Materials**—Bulletin 3-4 describes an economical monolithic corrosion-proof flooring material designed for fast one-layer installation. Advantages are detailed and physical and chemical properties of the flooring materials given. Atlas Mineral Products Co.

148 **Steel Equipment**—Featured in 64-pp Reference Manual 487 is a line of steel equipment, including slotted angle, mezzanine and floor grating, shelf filing, and large drawer units, as well as shelving, lockers, work benches, others. Includes photos and drawings illustrating design and construction details, as well as dimensional data, specifications and assembly instructions. Equipto.

149 **Acoustic Booth**—Descriptive information on the Hush-A-Booth, a wall-mounting type acoustic chamber for telephones and intercom equipment, is presented in Bulletin K9A. The Korfund Co., Inc.

150 **Pipe Applications**—This 10-pp guide shows how many industrial fixtures can be quickly constructed from ordinary pipe by using a simple universal clamp. Gives directions for assembling such items as racks, benches, booths, rails, shelves, carts, stands, etc. Tube-Strut Corp.

SAFETY, FIRE PROTECTION

151 **Safety Products**—Catalog A-1762, 40-pp, includes descriptions of plastic, metal and combination safety glasses, specially designed goggles and eye shields and complete specifications for safety lenses. There is additional information on vision testing instruments, ear protectors, etc. Bausch & Lomb Optical Co.

152 **Fire Fighting Equipment**—Illustrated and described in 16-pp Bulletin P-49 are portable fire extinguishers, wheeled units, built-in carbon dioxide extinguishing systems, and fire detection devices. A chart shows which extinguishers are approved for use on each class of fire. Walter Kidde & Co., Inc.

ELECTRICAL

153 **Individual Enclosed Breakers**—To aid in selecting Urelite individually enclosed low-voltage power circuit breakers, 8-pp Bulletin S-4261-2B describes engineering advances incorporated and provides application data. Outlines such features as visible break, closed-cover drawout, simple inspection and removal, manual quick-make, and others. I-T-E Circuit Breaker Co.

154 **Sealed Relays**—Bulletin GEA-6628A, 24-pp, contains up-to-date information on hermetically sealed micro-miniature, sub-miniature, miniature and high speed relays. Photos, circuit diagrams, coil data, and specifications are provided, also ordering instructions. General Electric Co.

155 **Power Switching Centers**—Detailed application and design information on power switching centers featuring building block design is presented in 20-pp Bulletin 1616A. Illustrates such standard cubicle components as potential and current transformers, lighting arresters, potheads and key interlocking safety equipment, and includes schematics of entrance and feeder arrangements. I-T-E Circuit Breaker Co.

156 **Welding Cable Connections**—Described in 12-pp Twecolog 12 are arc welding cable connections and accessories. Tables giving specifications and prices are included. Photos illustrate various types of clamps, electrode holders, cable connectors, terminal connectors, and other equipment. Tweco Products, Inc.

157 **Plastic Conduit**—Illustrated and described in this product bulletin is plastic pipe for electrical conduit. Mechanical, physical and electrical properties are tabulated, along with other specification data. Southwestern Plastic Pipe Co.

158 **An Arc Furnace Transformers**—Bulletin GEA-6236A, 24-pp, gives descriptive and technical data on transformers for electric arc furnaces for steel, ferro-alloy, non-ferrous metal, and chemical industries. It includes tables of performance, electrical characteristics, dimensions, weights and estimating prices, General Electric Co.

159 **Meter Buyers' Guide**—Bulletin GEC-1400B, 64-pp, provides up-to-date information on single-phase and polyphase watthour meters, watthour demand meters, meter sockets and water-heater time switches. This 1959 edition of company's meter guide features a quick-reference selection chart on standard meter applications and an index covering references to proper mounting equipment. Application indices, product data, ordering tips, pricing information given. General Electric Co.

160 **Battery Technology**—Bulletin GB-1896 is a 36-pp handbook of technical instructions and engineering data on the care of motive power storage batteries. Covers all phases of lead acid battery theory, operation and maintenance. Captioned line drawings are included, as well as basic information on specific gravity changes, charging and discharging cycles, plate composition. Gould-National Batteries, Inc.

161 **Vertical Battery Chargers**—A short course on operation and maintenance of vertical motor-generator chargers for electric industrial truck batteries and for other motive power applications is offered in Bulletin 5845. Covers day-to-day operations as well as periodic, preventive maintenance needs, and includes wiring diagram. Exide Industrial Div., The Electric Storage Battery Co.

LIGHTING

163 **Fluorescent Floodlights**—Six-pp Bulletin GEC-1487B describes Fluoroflood fluorescent floodlights for loading areas, service areas, building fronts etc. A rotating junction box which allows 360-deg aiming is diagrammed and calculated light distribution and photometric data listed. General Electric Co.

On pages 279-280 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in the ads.

164 **Floodlight Data in Brief**—Pocket-sized Bulletin 2714 is a 184-pp miniature edition of company's popular floodlight catalog, and includes all original material. Covers selection of floodlights, general purpose floodlights, heavy duty models, mercury vapor floodlights, special types, lighting for hazardous locations, searchlights, floodlight poles, accessories. Also includes installation suggestions. Crouse-Hinds Co.

MECHANICAL POWER TRANSMISSION

165 **Adjustable Speed Drives**—Bulletin GEA-6806, 16-pp, describes a ¼- to 25-hp line of mechanical adjustable speed drives. Discusses principles of operation, configurations and features, and includes mounting positions, rating tables, description of accessories. General Electric Co.

166 **Gear Motors**—Technical information on horizontal and vertical mounted gear motors with capacity up to 125 hp and a variety of output speeds from 780 rpm to 1.2 rpm is presented in 32-pp Bulletin J-17. Load characteristics table and selection data. Hewitt-Robins, Inc.

168 **For Big Jobs**—Vertical shaft Speedmaster gear reducers offering space and cost savings and heavy

BULLETINS

(Begins on page 25)

low speed thrust capacity are described in Bulletin 5908, about 16-pp. Provides selection information, dimensions, capacity data and ratings for these helical gear reducers, as well as lubrication information. Western Gear Corp.

170 Reinforced V-Belts — Advantages of V-belts reinforced with Dacron polyester fiber are detailed in this product bulletin. Performance characteristics are charted. E. I. Du Pont De Nemours & Co., Inc.

171 Flexible Couplings—Eight-pp revised Bulletin 597 outlines features required of a flexible coupling, including simple construction, accommodation of angular and parallel misalignments with minimum backlash, easy installation. Also tells how to select flexible couplings and shows installation and maintenance procedures. Chain Belt Co.

172 Variable-Speed Pulleys—Twelve-pp Bulletin 4101 describes variable-speed pulleys designed to eliminate freezing and sticking. Includes tables giving technical data, as well as dimensional diagrams and ratings. T. B. Wood's Sons Co.

173 Welded Steel Pulleys—Eight-pp Book 2540 describes a hydro-expansion-formed belt conveyor pulley designed to increase conveyor belt life. Gives detailed engineering and selection data, information on lagged pulleys, shaft and pulley assemblies. Link-Belt Co.

174 Idlers, Conveyor Pulleys—Comprehensive information on belt conveyor idlers for intermediate or moderate loads at moderate speeds is presented in 72-pp Bulletin 5980. Also includes data on welded steel pulleys for belt conveyor, bucket elevator and package-duty service, and a 10-pp section with easy-to-read charts of selection data. Chain Belt Co.

WELD AND MACHINE SHOP EQUIPMENT

177 Carbon Dioxide Welding—Metal-inert-gas-shielded-arc process welding of mild steel and low alloy steels with CO_2 shielding gas is described in 38-pp Bulletin EW-208. Provides information on equipment and power sources, welding costs, deposition rates, welding preparation and positioning, electrode wires, weld mefal properties, test specimens, others. Hobart Brothers Co.

178 Welding Carbon Products—This 14-pp pocket-size booklet describes in detail the use of welding carbon products—rods, plate and paste—for welding repair work to eliminate the need for many jigs and fixtures. Basic instructions for various repair jobs. The Arcair Co.

179 Gas-Shielded Welding—The story of automatic and semi-automatic CO_2-shielded welding processes is presented in 16-pp Bulletin MW-253. Charts outline typical applications, as well as such data as wire diameters, amperages, voltages, travel speeds, weld positions, deposition rates, and properties. A. O. Smith Corp.

180 New Drilling Concept—Catalog SP165, "The Spiral Point—A New Era in Drilling," is a 24-pp booklet explaining company's spiral point geometry for converting standard twist drills into precision tools. Illustrates cost-reducing advantages afforded, and shows operation of the Spiropoint drill sharpening machine which permits the new geometry to be produced in individual plants. Cincinnati Lathe and Tool Co.

181 Abrasive Wheels—Resinoid and vitrified bonded abrasive snagging wheels for portable grinding machines are illustrated and described in Bulletin ESA-304. Tables of dimensional data, standard sizes and shapes are included. Simonds Abrasive Co.

182 Automatic Production Lathe—Featured in 26-pp Bulletin 1213 is a line of automatic production lathes for a variety of high production applications. Each machine is completely illustrated showing features and accessories as well as floor plans and specifications. Actual job applications are shown and explained to illustrate versatility. Gisholt Machine Co.

183 Turret Drilling Machines—Features of design and construction of company's turret drilling machines and work-positioning tables are illustrated and described in 22-pp Catalog 1T. Details of turret head, speed, depth and tapping controls, automatic cycle assembly, power index, feed control, air control, work-positioning tables are illustrated. Brown & Sharpe Turret Drilling Div., Inc.

CLEANING, DESCALING

185 Ultrasonic Cleaning—This 12-pp booklet includes a simplified explanation of basic principles of ultrasonics, a brief description of generating equipment and transducers required for ultrasonic cleaning, discussion of applications, and a list of most frequently asked questions. Circo Ultrasonic Corp.

186 For Water Cleaning—Bulletin 5983 contains 12 pp of information on features and applications of the Water Knife which provides microthin blades of water for washing, cleaning, descaling and cooling. Selection data given. Chain Belt Co.

187 Descaling Machines—Photos, diagrams, cutaways and sketches in 20-pp Bulletin 609 show details and operating features of Rotoblast wheels which provide cleaning force for mechanical descaling equipment. Various cabinet designs and material handling features appropriate to job described. Pangborn Corp.

INSTRUMENTS, CONTROLS

188 Instrumentation, Control—Eight-pp Bulletin 59-CO91 (297) is divided into sections for convenient use. Sections 2 through 6 list instruments according to major process variables—pressure, flow, temperature, level and gas analysis. Section 7 lists receivers. Section 1 describes all-electric combustion control systems. The Hays Corp.

189 Indicators, Controllers—Bulletin 65 presents electronic self balancing indicators and indicating controllers which indicate any process variable convertible to an electrical quantity and may be connected to multi-point switches. Potentiometer and bridge type units are described. Thermo Electric Co., Inc.

190 Hydrostatic Instruments—This 88-pp pocket-size handbook of hydrostatic instrumentation includes information on principles of hydrostatic measurement, selection and installation of instruments, design and construction of panel systems, as well as engineering data and diagrams. Provides tank volume formulae, conversion tables, viscosity charts, hydrometer scales, specific gravity tables for liquids. Petrometer Corp.

OTHER EQUIPMENT

192 Power Lubrication System—Automatic power lubrication systems for trucks, trailers, material handling equipment and industrial machinery are described in 24-pp Catalog 50. Includes illustrations and specifications, as well as information on various applications and methods of operation. Lincoln Engineering Co.

193 Maintenance Record System—Featured in this 8-pp illustrated bulletin is a visible productive maintenance record system with lubrication and inspection schedules. Shows forms designed to promote accurate scheduling and maintenance follow through. Acme Visible Records, Inc.

195 Glass-Ceramic—Featured in 8-pp Progress Report No. 3 is detailed data on Pyroceram, a glass-ceramic. Included are electrical, mechanical, thermal and chemical properties of the material, as well as design considerations and applications, comparative property chart. Corning Glass Works.

196 Metal Packing—Comprehensive data for selection, application and installation of metal packings for pumps, engines and compressors is presented in 24-pp Bulletin AD-166. Six sections of the bulletin cover free-floating metal packing, metal rod packing rings, metal scraper rings, metallic or non-floating packing and piston rings. The Garlock Packing Co.

197 Process Equipment—Illustrated and described in 8-pp Bulletin B-I-F 5-1 are equipment, systems and controls for the process industries. Illustrates and describes meters, instrumentation, feeders, cooling systems. B-I-F Industries, Inc.

"WE REDUCED INSTALLATION TIME 25%

with PITTSBURGH FIBER GLASS PIPE INSULATION"

says Mr. Charles W. Smith, President
Standard Insulation Products, Inc.
Baltimore, Maryland

Pittsburgh Fiber Glass Pipe Insulation is easily slipped on the pipe. Insulation will be hand-stapled in place, eliminating metal strap fasteners.

"We installed 4,800 ft. of Pittsburgh Fiber Glass Pipe Insulation at Our Lady of Fatima School in Baltimore on water, steam and dual-temperature pipes. The handling ease and application speed of this product, compared with the insulation material previously used, saved us 25% in installation time costs.

"The three-foot lengths are easily spread by hand at the seam and are slipped quickly and snugly over the pipe. Hand stapling eliminated the need for metal strap fasteners. For special lengths, the insulation was easily cut with a knife. Wastage was negligible. Cut ends retained their shape with no fluffing. Short left-over pieces were used on fittings.

"The factory-applied vapor barrier eliminates condensation, which reduces future maintenance costs. Outside jackets present a good appearance and can be painted to match room decorations."

SAVE TIME WITH PITTSBURGH PIPE INSULATION

You can order Pittsburgh Fiber Glass Pipe Insulation in a variety of thicknesses and jackets to your own specifications. For complete information, call your nearest PPG Sales Office, or write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 279 and 280.

LIGHTING, COMMUNICATION

301 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

302 Lighting Units—Design and performance advantages of Wide-Lite units for use with color-corrected mercury vapor lamps are detailed in this product Bulletin 405. Typical candlepower distribution curves are included. Wide-Lite Corp.

303 Signal Equipment — Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics. Federal Sign & Signal Corp.

INSTRUMENTS, CONTROLS

304 Precision Instruments—Catalog G1 contains 32 pp of comprehensive information on indicating, recording and controlling instruments. Contains descriptive and illustrative data on potentiometers, pyrometer supplies, systems and components, null indicators, amplifiers and oscillographs, pressure gages, flow and liquid level meters, pneumatic remote transmission, thermometers, panelboards, valves, diaphragm motors, motor and dampers, switches, etc. Minneapolis-Honeywell Regulator Co.

306 Meters Regulators, Valves — Bulletin C-5000, 28 pp, describes and illustrates meters, regulators and valves for a wide range of services. They include gas meters, gas pressure regulators, industrial meters, water meters. Information includes application suggestions, specifications and references to more detailed product literature. Rockwell Mfg. Co.

307 Turbine-Type Flowmeter—Described in this 8-pp bulletin is a turbine-type flowmeter for bulk plants, pipelines, refineries, chemical, food processing and other industrial services. The Potter-Bowser Meter Div., Bowser, Inc.

308 Control of Levels—This 16-pp illustrated booklet describes in detail the measurement and control of level in many processes. Covers applications of capacitance-type devices in quantitative measurement and control of granular solids, liquids, powders and interface. Several specific industry uses described. Instrument Div., Robertshaw-Fulton Controls Co.

309 Graphic Instruments—Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders. The Esterline-Angus Co., Inc.

310 Control Pilot—Bulletin 583 describes characteristics of a liquid level control pilot which uses a fixed metering orifice to restrict the air supply. A schematic sectional view illustrates operation. Leslie Co.

311 Oil Leak Detection—Eight-pp illustrated Bulletin 80, on the Paraprobe oil leak detection system for steam-type fuel oil heaters gives a detailed explanation of the operation of the system. Provides installation diagrams. Davis Engineering Corp.

WATER TREATMENT

312 Cooling System Treatment—Bulletin C1 describes advantage of company's treatment for cooling tower systems with synergised polyphosphates. Details of the cooling system treatment are given. Nalco Chemical Company.

313 Consulting Service — Advantages of company's consulting service are detailed in 8-pp Bulletin 5006-A. How the service is qualified to solve problems concerning scale and corrosion control in boilers, cooling systems, and process waters is discussed. Dearborn Chemical Co.

HOSE

315 Industrial Hose—Bulletin IH-10 features application and selection data on industrial hose, including braided, wrapped and braided, wire woven, smooth bore and rough bore. Descriptions of each type of hose are given. The Gates Rubber Co.

316 Industrial Teflon Hose—Bulletin 2140 describes advantages of Teflon and its applications in a variety of industries where resistance to temperature, pressure, corrosion and contamination is desired. Teflon hose specifications are included, as well as assembly procedure. Titeflex, Inc.

VALVES, PIPING, FITTINGS

317 Stainless Steel Valves—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Jenkins Bros.

318 Steel Check Valves—Bulletin 110 describes features and advantages of steel check valves for vertical or horizontal installation. Specifications and dimensional tables are included. Combination Pump Valve Co.

319 Industrial Valves — Bulletin 507X illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, water valves, slide valves. W. S. Rockwell Co.

320 Impulse Steam Traps—Bulletin T1744 describes a line of impulse steam traps designed for light condensate load requirements. Operation is detailed, and capacities, dimensions tabulated. Yarnall-Waring Co.

321 All About Valves—Circular 606 entitled "What is a Valve?" is a 36-pp booklet detailing the four basic designs from which valves are developed. Basic materials from which valves are made—such as bronze, cast iron, steel and PVC—are illustrated, as are typical applications of valves, and descriptions of different types of valves for specific applications given. The Lunkenheimer Co.

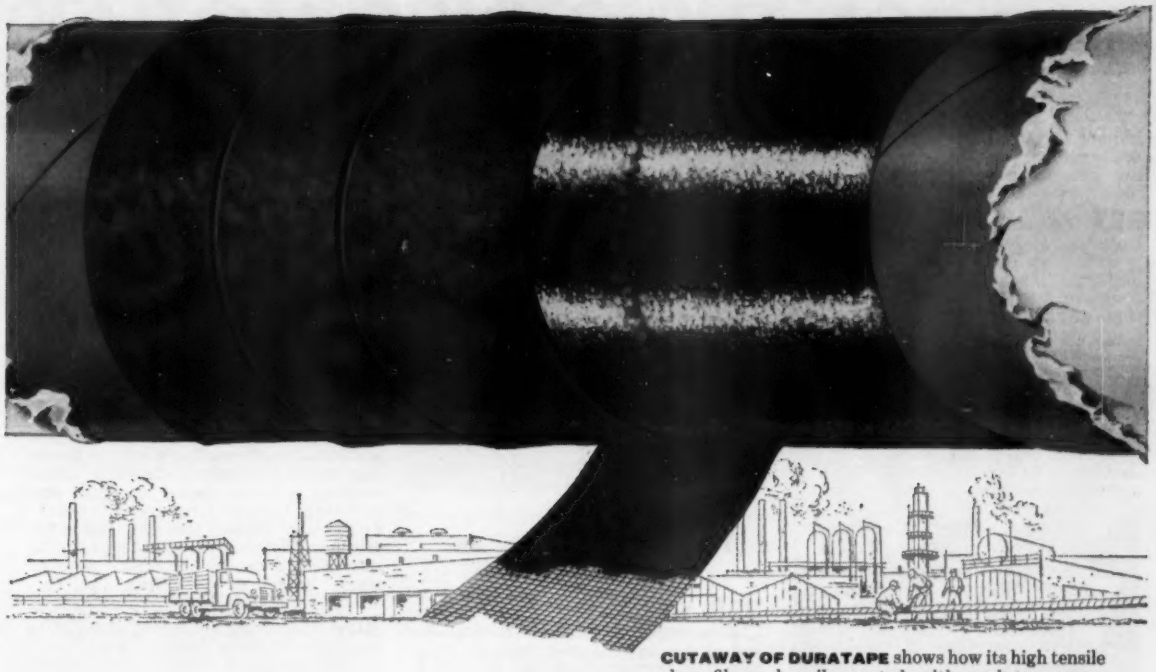
322 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, repairs. Armstrong Machine Works.

323 Glass Pipe and Fittings—Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

324 PVC Pipe, Fittings—This 12-pp bulletin contains latest technical information on polyvinyl chloride pipe and fittings, including advantages and properties, general characteristics and applications, physical properties, installation instructions, flow rate charts and complete specifications. Also included is a chemical resistance chart of various reagents and their effect. Mueller Brass Co.

325 UPVC Pipe, Fittings—Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in 24-pp Booklet TTP-119. Also gives specifications for threaded and socket types of UPVC fittings, valves and flanges, of normal and high-impact material. Tube Turns Plastics, Inc.

326 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for



CUTAWAY OF DURATAPE shows how its high tensile glass fibers, heavily coated with coal tar or asphalt, provide an extremely durable dielectric shield.

Mill-wrapped pipe lasts only as long as its joints . . . that's why

more and more companies use Johns-Manville Duratape® to protect pipe joints

QUICK, EASY APPLICATION. Simply wrap primed joints with Duratape . . . flash-seal with low-temperature torch during and after application. Wrap can be similarly applied to elbows, tees and other pipe fittings.

J-M Duratape Joint Wrap is designed to give pipe joints the kind of protection they need to live as long as the rest of the pipe. It forms a tough dielectric barrier with excellent resistance to corrosive elements.

Made of high tensile glass fibers, and heavily coated with coal tar or asphalt, Duratape forms a tight bond with the pipe and a lasting seal against corrosion. In many years of actual use, this combination of inorganic glass fibers with coal tar (or asphalt) has proved to be far superior to organic base tapes.

Duratape is also fast and easy to install. This, plus its initial low cost, permits extensive savings on joint-wrapping. No problem with tearing, either, because of its strong, reinforcing glass fibers.

Your nearby Johns-Manville representative has samples and complete information. Contact him, or write to Johns-Manville, Box 158, New York 16, N.Y. In Canada, Port Credit.

WHEN ORDERING mill-wrapped pipe, be sure to specify the J-M "Partners in Pipeline Protection"... Blue Flag® Fiber Glass Wrap for enamel reinforcement with an outer shell of J-M Asbestos Felt . . . for *complete* pipe protection.

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DATA FILE

(Begins on page 284)

impact in air lines, for low pressure applications, for vacuum and very low pressures, etc. Snap-Tite, Inc.

327 Forged Steel Unions—Eight-pp Bulletin U-2-58 provides detailed specification data on all types, sizes, of forged steel unions, materials and pressure ratings. Design and application advantages are discussed and illustrated. Forge and Fittings Div., H. K. Porter Co., Inc.

328 Swivel Joint — Features and advantages of company's swivel joint which permits fast, easy packing interchangeability are illustrated and described in Bulletin 1258. Table of specifications and properties are included, as well as dimensional data and diagrams. Chiksan Co.

329 Self-Cleaning Strainer—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

330 Bellows Design Guide—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Flexonic Corp.

FILTRATION

331 Improved Filters — Bulletin GEO-507 describes Fulflo filters for compressed air and other gases, covering single tube models for operating pressures from below 125 psi to 4000 psi, and flow rates to 800 scfm, also multi-tube models for high flow rates. Includes technical information and charts on flow characteristics, dimensions. Commercial Filters Corp.

332 Filters for Industry—Illustrated and described in this product bulletin are filters for a variety of applications in industry. Among those covered are liquid filters, intake filters, pipe line filters, dry and viscous panel filters, precipitators, Electro-Staynew mist collector, and a dual action filter. The Dollinger Corp.

DUST, FUME CONTROL

333 Dust Control Systems—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other dust filters. The W. W. Sly Mfg. Co.

334 Power Exhausters — Bulletin 58-B contains 12 pp of detailed information on company's line of power exhausters. Construction features are illustrated and described, and performance and dimensional tables are included. Cutaway views and drawings show internal construction features. Jenn-Air Products Co., Inc.

335 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

337 Air Pollution Control — Featured in this 8-pp bulletin are solutions to air pollution control and heat recovery through catalytic oxidation. Typical problems and solutions in organic finishing and drying, chemical industry, oil refinery industry, and food processing industry are detailed. Oxy-Catalyst, Inc.

FANS, VENTILATING, AND AIR CONDITIONING

338 Induced Draft Fans—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

339 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance and physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

340 Duct Fans — Bulletin A114A, 12-pp, presents belt-drive fans, from 12 to 60 in., with adjustable driver sheaves which permit quick adjustment of fan speed. Also gives dimensions, performance data and construction details on direct-drive duct fans in the same size range, the Bi-Pass duct fan with the motor mounted in a tunnel out of the air stream, and a reversible fan. Hartzell Propeller Fan Co.

341 Industrial Fans—Bulletin I-585 contains 16 pp of detailed information on industrial fans for use as blowers and exhausters. Includes temperature and altitude selection data, capacity tables, dimensional diagrams of arrangements, and other information. The Day Co.

342 Industrial Diffusers—Described in 8-pp Catalog F-7722 is a line of industrial diffusers designed for applications where full range air pattern adjustment is essential to human comfort. Complete dimensional data, diagrams and specifications are included. Barber-Colman Co.

343 Standard Duty Fans—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 572. Points out advantages, shows arrangement and application, describes accessories. The New York Blower Co.

344 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements are provided. Aerovent Fan Co., Inc.

345 Zone Control Cabinets — Air conditioning zone control cabinets are described and illustrated in 20-pp Bulletin AC-220. Separate sections with tables, curves and sketches cover proper unit selection, physical data, dimensions, fan performance and coil ratings for water cooling, direct expansion, hot water and steam. Buffalo Forge Co.

346 For Air Handling—Sixteen-pp Bulletin 518 illustrates and describes manufacturer's products for air filtering, cooling, heating, cleaning (controlling process dust), moving, exhausting, humidifying and dehumidifying air. These include Kennard, Herman Nelson, Illinois Engineering and American Air Division product lines. American Air Filter Co., Inc.

347 Air Conditioning—Featured in this 8-pp Bulletin S-290 is company's line of products for air conditioning, as well as products for heating, ventilating and heat transfer. Installations illustrated. The Trane Co.

348 Blowers at Work—How units of company's California series of rotary positive pressure blowers and gas pumps are used to solve several air and gas handling problems is told in 8-pp Bulletin S-59G. Illustrated with photos and dimensioned drawing, bulletin shows a variety of applications. Sutorbilt Corp.

349 Liquid Cooler—Bulletin 104R features a liquid cooler for accurate control of chilled water or solutions. Advantages are fully detailed and diagrams showing design and construction features are includd. Niagara Blower Co.

MAINTENANCE

350 Basic-Roofing Information — "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioriation, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

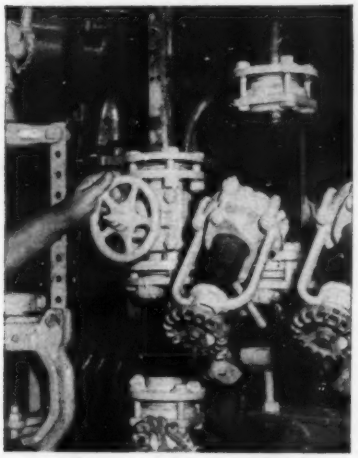
351 Handbook on Coatings — This is a 32-pp treatise highlighing the stopping and preventing of rust on nearly all types of rustable metal. Book contains information and recommendations to enable determination of specific coatings needed. Basic principle of Rust-Oleum's fish oil penetration into metal is shown. Rust-Oleum Corp.

352 Color Conditioning—How to put the power of color to work profitably is explained in this 28-pp color conditioning booklet. Tells how color

PENTON® PRICES CUT 40%

Growing list of commercial uses for new corrosion-resistant plastic now includes pipe and tank linings.

Wilmington, Del.—Hercules Powder Company has announced reductions ranging up to more than 40% in the price of Penton, new corrosion-resistant plastic. The reduction effects a complete revision in the price structure of this new chlorinated polyether thermoplastic, reflecting its new status as a commercial product.



This Penton-lined Hills-McCanna valve has already been in service for more than 45 months in a severely corrosive environment.

Separate price categories have been established for natural formulations, and olive drab and black formulations. All were formerly priced at $6.00 per pound. The new base price of natural Penton in 6000-lb. quantities is $3.50. The corresponding base price for olive drab and black Penton is $3.75. Substantial reductions over the former price have also been effected in other quantity categories.

The complete Penton processing package includes pipe and fittings made with solid Penton, or Penton-lined metal.

CHEMICAL INERTNESS

Penton is a chemically inert industrial plastic providing a broad spectrum of corrosion resistance, particularly at elevated temperatures. It is already well-established in a variety of anti-corrosion uses as a result of 5 years of product development during the time when only limited commercial quantities of material were available.

G. M. Taylor, supervisor of Penton sales, says that the price reduction is expected to greatly expand established markets for Penton, and at the same time stimulate and broaden its acceptance in new applications. It reflects the savings in production costs which will be possible in the operation of a large-scale commercial plant.

At its new price Penton, which was already substantially lower in cost than high-priced metals and alloys in many corrosion-resistant uses, will offer economies over a broad list of conventional and synthetic materials in the whole range of industrial uses where its application is indicated.

THE PENTON CORROSION PACKAGE

Valves, pump parts, pipe, tubing, fittings, flow meters, and corrosion-resistant meter parts are included in the list of Penton products now commercially available. The list of uses continues to grow and now includes precision molded gears and bearings, tank linings, drum linings, gaskets, and closures.

Penton can be economically formed by compression and injection molding and extrusion. It is readily fabricated or machined from sheet, rod, or block stock. It can also be applied as a coating on metal surfaces, giving them greater durability in a wide range of adverse environments.

Penton sheets, rods, and tubes are now commercially available for use in the custom fabrication of processing components or pilot models.

Penton coatings and linings provide an economical means of producing corrosion-resistant vessels of various sizes and shapes.

HERCULES

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INCORPORATED
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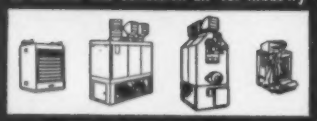

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DATA FILE

(Begins on page 284)

conditioning boosts production, improves morale and promotes safety, and includes some full-color photos to illustrate "before-and-after" situations in typical plants. E. I. du Pont de Nemours & Co., Inc.

353 Zinc Coating — This bulletin describes a special zinc coating applied as a paint to provide galvanic protection to metals. A variety of applications are detailed. Subox, Inc.

354 Aluminum Paint—Benefits providd by aluminum paints for interior and exterior use are detailed in this product bulletin. Typical applications are illustrated and described. Reynolds Metals Co.

355 Preventive Maintenance—How preventive maintenance pays off in dependable, predictable production is detailed in illustrated Form 149-1. Company's non-destructive testing methods are described, as well as typical examples of preventive maintenance in industry and typical uses. Magnaflux Corp.

356 Cleaning Machines—Pipe and drain cleaning machines and accessories are described in 8-pp Price List 758. Illustrations as well as descriptive details and prices are included. Kollmann Mfg. Co.

BOILERS AND GENERATORS

357 Hot Water Boilers — Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Combustion Engineering, Inc.

358 Scotch Marine Boilers — Featured in Bulletin B-3333 is a line of Scotch Marine Boilers designed to meet exacting mechanical and thermal specifications. Mechanical and thermal features are detailed and specifications tabulated. The Titusville Iron Works Co.

359 Self-Contained Boilers—Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are also covered. Cleaver-Brooks Co.

361 Steam Generator—Bulletin 582 CS describes design and operation features of company's vapor water tube steam generator which differs from conventional water tube steam generators in that initial heating and final vaporization occur in the shell. TXT Texsteam Corp.

362 Generators, Auxiliaries—20-pp Catalog SB 60, on steam generators and allied equipment, provides cross section views of major products to

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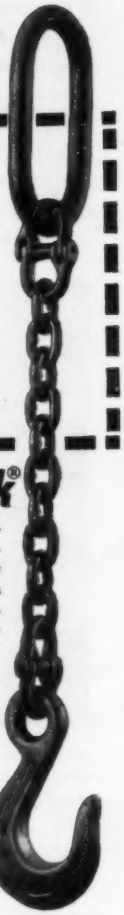

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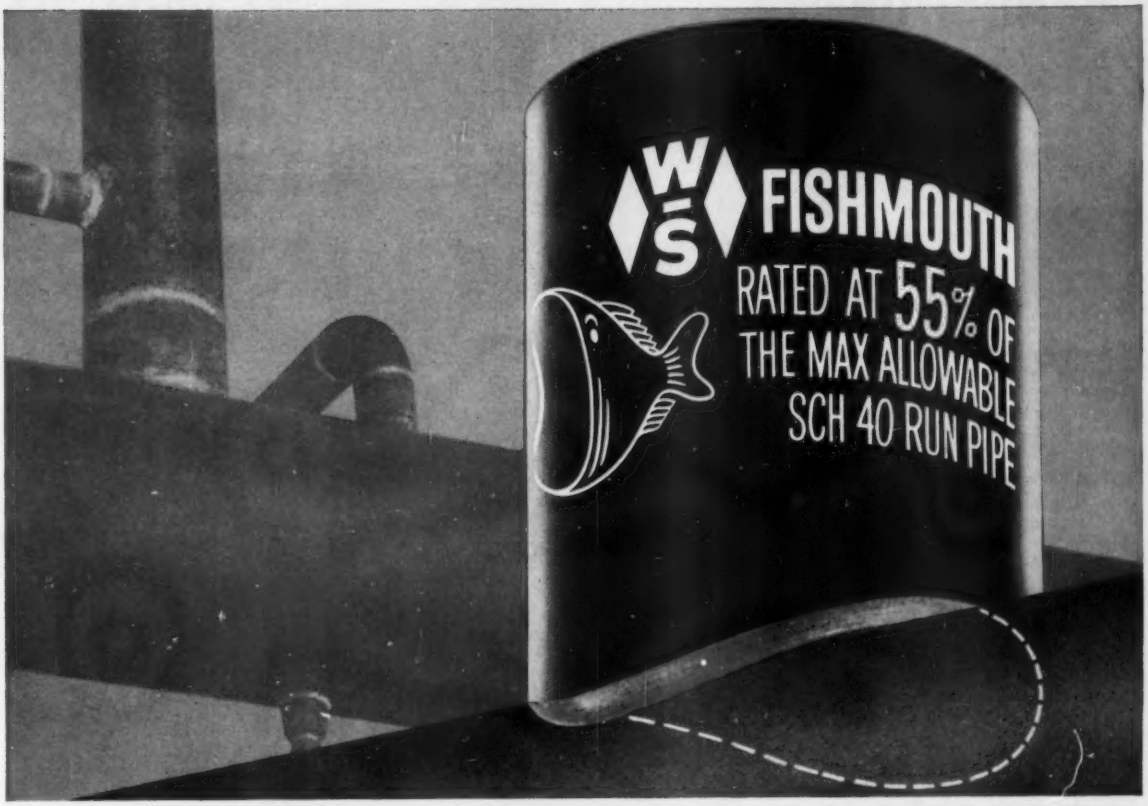

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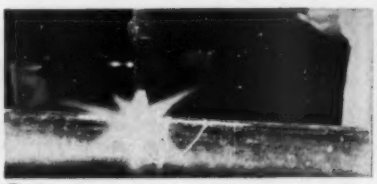

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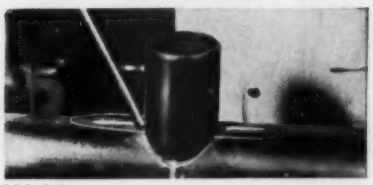

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DATA FILE

(Begins on page 284)

show design and construction. Standard and special boilers are included, also burners. Erie City Iron Works.

PUMPS, COMPRESSORS

363 Single Suction Pumps—Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-H. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings. Buffalo Pumps, Div. Buffalo Forge Co.

364 End Suction Pumps—Described in Bulletin 158 are horizontal shaft, single stage, and suction pumps designed for handling abrasive mixtures and slurries, as well as corrosive and hot liquids. Various models in the line are described as to design and application. Nagle Pumps, Inc.

365 Rotary Pumps—The positive displacement principle upon which these rotary pumps operate is illustrated and described in 34-pp Bulletin Section K. Discusses rotary pump fundamentals and includes detailed engineering data and selection tables. Viking Pump Co.

366 Rotary Pumps—Described in this bulletin are company's Series A internal gear rotary pumps for transferring a variety of liquid types in low medium viscosities. High- and low-speed models are available and pumps can be supplied in four constructions. Bulletin provides performance data and dimensions, drive assemblies. The Wayne Pump Co.

367 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

368 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

369 Centrifugal Pumps—Two-stage centrifugal pumps designed for a wide range of heavy-duty pumping applications are illustrated and described in 16-pp Bulletin Form 7062-D. Details of impeller design and arrangement are illustrated with cross sectional views, and tables of performance characteristics are included. Ingersoll-Rand Co.

370 Centrifugal Pumps—Catalog A-156 describes and illustrates company's line of double-suction single-

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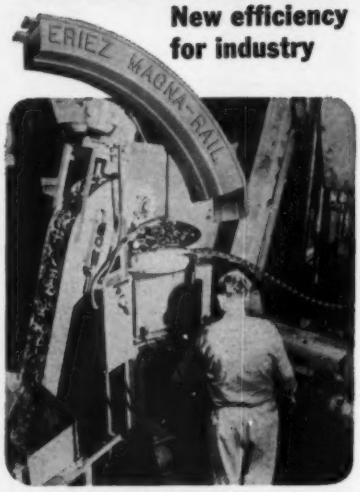

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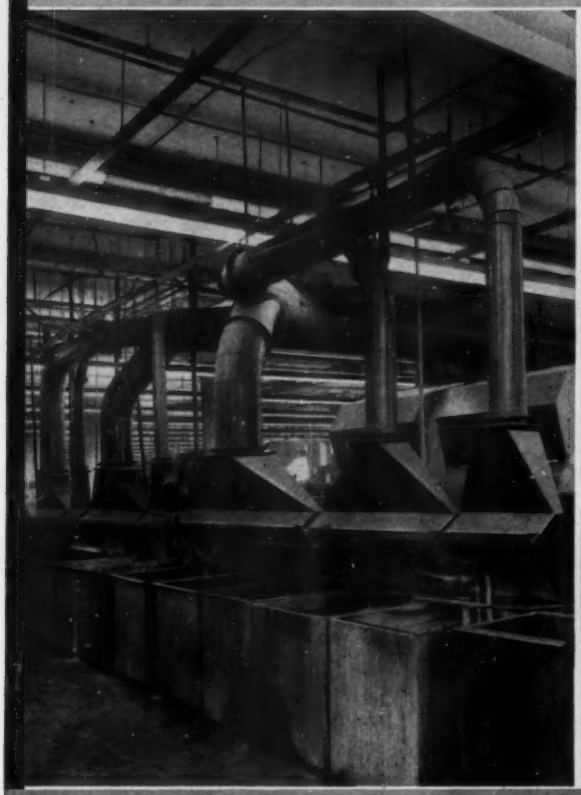

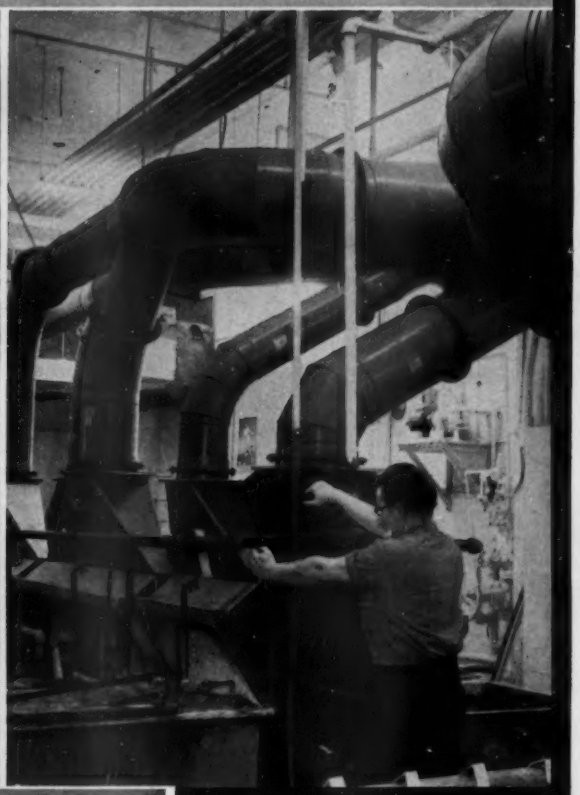

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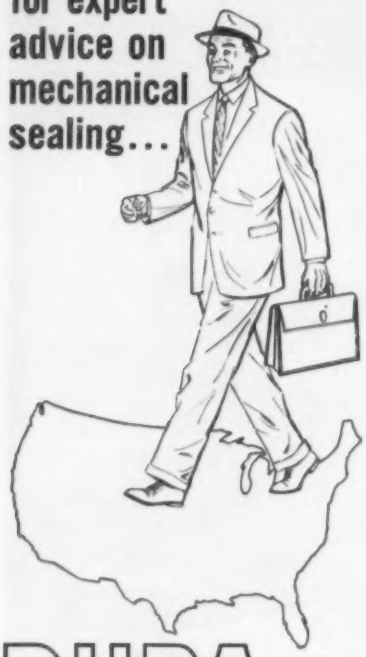

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(Begins on page 284)

stage centrifugal pumps. Features are detailed, and cross section drawing and construction details are included. C. H. Wheeler Mfg. Co.

371 Air Compressor — Illustrated and described in Bulletin 161 is a balanced/opposed industrial air compressor which comes as a completely packaged unit. Design and construction features are shown on cutaway diagram and specifications and dimensional data given. Clark Bros. Co.

372 Oil-Free Compressors—Heavy-duty industrial oil-free compressors are featured in 12-pp Bulletin A-44. Component parts are illustrated and described, and internal construction is shown on cutaway. Joy Mfg. Co.

373 Heavy Duty Compressor — Eight-pp Bulletin 350 describes and illustrates a horizontal, water-cooled, single-stage, heavy duty compressor designed to fit most compressed air applications. Photos, line drawings and cross-sectional views illustrate construction details. Pennsylvania Pump & Compressor Co.

374 Water-Cooled Compressors — Featured in 12-pp Bulletin WB10 are two-stage water-cooled air compressors designed to meet the demand for small machines having efficiencies comparable to those of large two-stage horizontal compressors. Cutaway views showing component features are included, as well as general data tables. Gardner-Denver Co.

375 Stationary Compressors — Six teen-pp Catalog 5910 describes features and advantages of a line of stationary air compressors designed for a variety of industrial needs. Tables of weights, code words, and dimensions are included, as well as schematic diagrams, cutaway views showing design details, and other data. Schramm, Inc.

LUBRICANTS, LUBRICATION

376 Lubrication Systems—Bulletin 1450 illustrates and describes a line of lubrication and coolant systems engineered to provide maximum protection to bearing surfaces. A typical mill lubrication system is shown. Dravo Corp.

377 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of greases, application and performance characteristics. Sinclair Refining Co.

378 Organized Lubrication — Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. Texaco, Inc.

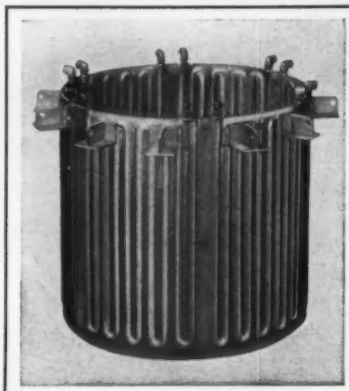
379 Product Guide — This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

380 Lithium Base Grease—Featured in this 12-pp booklet is a multi-purpose lithium base grease designed to do the work of many. Characteristics of the grease under different types of industrial conditions are described, and advantages listed. Gulf Oil Corp.

HEATERS, HEATING

381 Unit Heaters—Catalog 158, 28 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, performance factors. Modine Mfg. Co.

382 Electric Process Heaters—Catalog 60, 64-pp, illustrates complete line of Chromalox electric process heaters and discusses their many uses. Presents some 15,000 types of heaters to fit most applications. Includes a comprehensive application section and a technical section to aid in ac-



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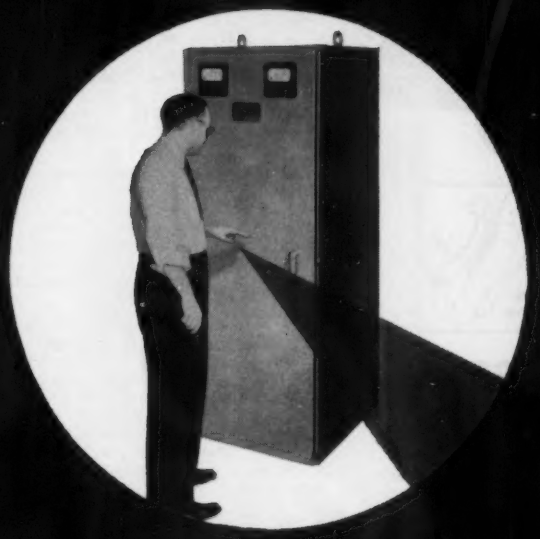

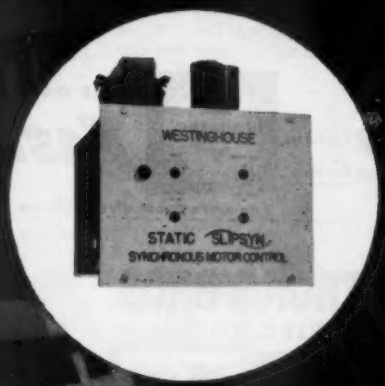

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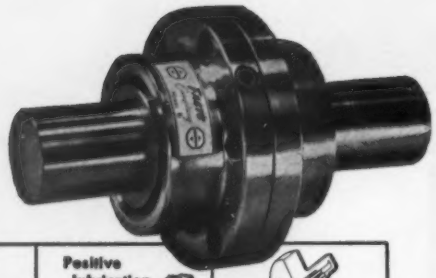

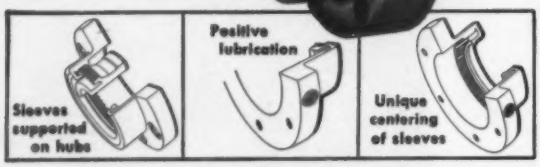

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DATA FILE

(Begins on page 284)

curate calculation of heating requirements. Each product is illustrated and described with lists of types, sizes and ratings. Edwin L. Wiegand Co.

383 **Heating and Ventilating**—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Lennox Industries Inc.

384 **Thermo-Panel Coil**—Technical Data Bulletin 355 is a 48-pp guide to company's panel coil for heating and cooling applications. Features of materials and design are illustrated and described, and detailed specification and dimension tables, heat transfer coefficient charts, capacity tables, other data are included. Dean Thermo-Panel Coil Div.

CONSTRUCTION

385 **Foundation Pipe Piles**—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

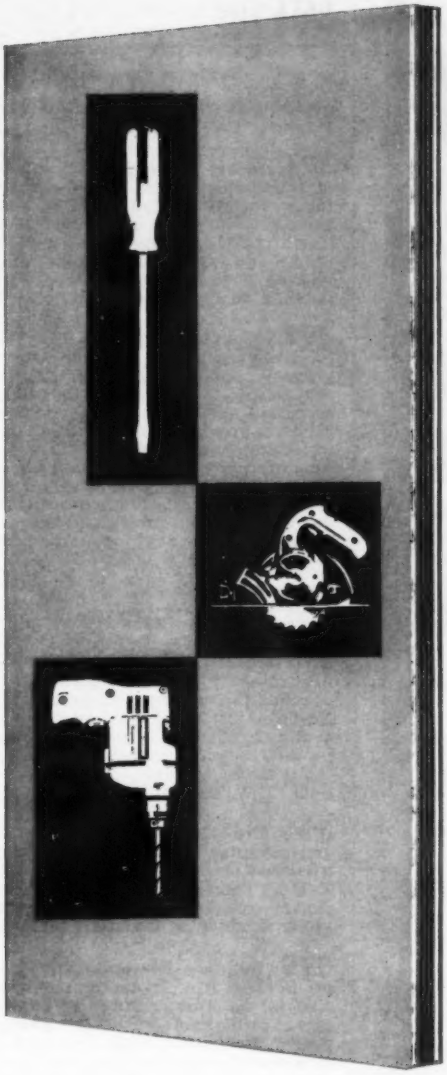
386 **Tubular Building Frames**—Described in 6-pp Bulletin 5M are advantages of company's line of tubular building frames which require no welding, cutting, riveting or bolting at building site. Design and construction details are illustrated. Swiss Fabricating, Inc.

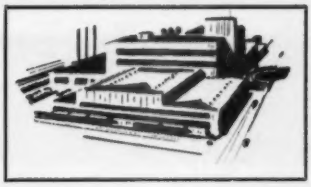
387 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

388 **Aluminum in Colors**—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Aluminum Co. of America.

389 **Steel Floor Plate**—Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

390 **Guide to Shelving**—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for





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Gold Bond Asbestone Panels can be used either for exterior curtain walls or for handsome interior partitions. They're made of an insulation core, laminated between two sheets of noncombustible Asbestos-Cement. The core provides insulation and sound resistance, and the Asbestos-Cement sheets are immune to weather, moisture, fumes, rot and termites. Maintenance costs are almost non-existent.

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DATA FILE

(Begins on page 284)

planning of stockrooms. Deluxe Metal Products Co. Royal Metal Mfg. Co.

391 **Safety Grating**—Steel, aluminum and stainless steel safety grating for a variety of industrial applications is featured in illustrated 24-pp Catalog 5911. Shows typical installations, and includes complete engineering data for erection, as well as detailed load charts. The Globe Co.

392 **Grout Failure Prevention**—How to avoid shrinkage through use of properly applied nonshrink grout is told in this 16 pp booklet. Describing successful grouting techniques with Embeco grout, bulletin outlines and illustrates common methods of grouting different types of equipment, mixing and placing of grout and hot and cold weather grouting. Information on recommended mixes and estimating tables plus actual installations are included. The Master Builders Co.

INSULATION

393 **Insulation Coating**—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Lists applications. J. W. Mortell Co.

394 **Pipe Insulation**—Properties and advantages of fiber glass pipe insulation are detailed in Bulletin F-110. Tables list dimensional and packaging data, and specifications given. Pittsburgh Plate Glass Co.

395 **Building Insulation**—Twenty-pp Booklet FB-105 contains descriptive information on uses of cellular glass insulation on roofs, parking decks, core walls, wall linings, curtain walls, perimeters and ceilings. It contains drawings and specifications for typical applications, as well as technical data and charts. Pittsburgh Corning Corp.

MATERIALS HANDLING

396 **Electric Hoists** — Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

397 **Electric Hoists**—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

398 **For Lifting, Pulling**—Bulletin 146-G describes a portable, light-

weight puller designed for lifting and pulling in any position. Operation and maintenance details are given, as well as specifications and other data. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

399 Vibrating Conveyors—Advantages and features of vibrating conveyors are detailed in 16-pp Catalog 66. Layouts and flow charts showing how conveyors can be designed to perform a wide variety of processing operations at the same time the material is being conveyed are included. Ajax Flexible Coupling Co., Inc.

400 Industrial Cranes — Described in Bulletin GL-758 are industrial cranes for a variety of applications, including heavy duty cranes, full gantry, top-running double girder, motor driven cranes with outriggers, semi-gantrys, hand-geared cranes, push-types cranes, underhung motor driven multiple runway cranes, and others. Borg-Warner Corp.

401 Conveyor Belt Carrier—Bulletin 355, 20-pp features comprehensive technical data, specifications and illustrations on conveyor belt carriers for conveying bulk materials. Dimensional data and diagrams are included. Stephens-Adamson Mfg. Co.

402 Continuous Power Conveyor—Featured in 64-pp Catalog A-93-R is a continuous power conveyor designed to meet the resuirements for handling continuous production items. Component parts of the system, including track, chain, and suspension components, are fully illustrated and described. Installations in a variety of industries are illustrated. Richards-Wilcox Mfg. Co.

403 Conveyor Belts — Data Sheet 2470 describes advantages and construction features of heavy industrial Koroseal conveyor belts for use in contact with cutting oils and greases in metal-working plants; chemical plants where belts handle wet, sticky materials; in pulp mills, glass plants, plastic, textile plants, others. B. F. Goodrich Industrial Products Co.

404 Crane System — Twenty-pp Bulletin TRC-101 describes advantages and applications of company's Trak-Rak crane system and features typical installations in auto body handling, bar stock storage, container storage, pipe storage, pallet and skid storage, skid box storage, tote pan storage, small parts storage, others. Engineering data and dimensional diagrams. Chicago Tramrail Corp.

405 Vibratory Equipment — Featured in this 40-pp brochure is a line of vibratory equipment, including feeders and unit vibrators. Design and construction features are illustrated and described and advantages detailed. Dimensional drawings and diagrams are included, as well as specifications. Eriez Mfg. Co

406 Multi-Purpose Dumper — Described in this 8-pp catalog are vertical, senior, junior and hydro dumpers. Pictures show applications of dumpers in various industries, and illustrate how the equipment can be adapted to handle bags, boxes, bulk and drums. Specifications and dimensional drawings are included. Essex Conveyors, Inc.

407 Self-Dumping Hopper — Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described in detail. Roura Iron Inc.

408 Industrial Casters—Catalog 159 contains 24-pp of illustrations, descriptions and specification data on swivel-plate and rigid-plate truck casters for industrial applications. Includes detailed information on spring-action casters, V-grooved casters, grease-sealed casters, scaffold casters, floor truck locks, industrial wheels, and others. Faultless Caster Corp.

409 Caster, Wheel Manual—Featured in 192-pp Manual 65 is comprehensive information on company's complete line of casters, wheels, glides, desk shoes and accessories. Profusely illustrated with photos and dimensional drawings and diagrams of the various types of casters and wheels for a variety of applications, the manual contains tabulated engineering and price data. Darnell Corp.

SLINGS, CHAINS, FITTINGS

410 Slings For Industry—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a must. Macwhyte Wire Rope Co.

411 Sling Chains—Seven points to consider when buying sling chains are outlined in this product Bulletin DH-101. A working load limit table is included. American Chain Div., American Chain & Cable Co., Inc.

412 Sling Chain Handbook—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of the sling chains. Columbus McKinnon Chain Corp.

413 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Crosby-Laughlin Div., American Hoist and Derrick Co.

TOOLS, WELDING, AND MACHINE SHOP

414 Welding Positioners—Illustrated and described in 16 pp Bulletin P-28 is a line of welding positioners ranging from 3000 to 100,000 lb capacity. Features and advantages are detailed, and dimensional diagram,

PAGE

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(other quality fabrics available:
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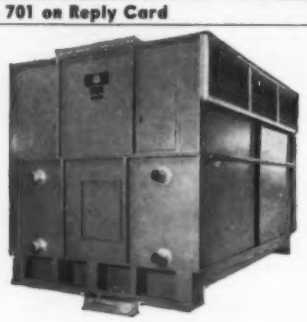
This Self-Contained Fluid Cooling System

... gives most accurate temperature control



Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input,* giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

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District Engineers in Principal Cities of U. S. and Canada

For more facts circle 702 on Reply Card

DATA FILE

(Begins on page 284)

and load tables included. Harnischfeger Corp.

415 Pipe Tools—Ordering and application information on Rigid pipe tools is provided in 16-pp illustrated Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives. The Ridge Tool Co.

416 Hydraulic Jacks Pullers—Bulletin Hydraulic-56, 16 pp, features company's line of hydraulic jacks and pullers. Prepared as an application guide for using various high-pressure jacking and pulling tools, it contains full descriptions, mechanical specifications. Templeton, Kenly & Co.

417 Powder Actuated System—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance — fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, etc. The second booklet indicates the correct fastening and charge to use to fasten materials to concrete or steel. Ramset Div., Olin Mathieson Chemical Corp.

418 Power Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 55-pp catalog. Tools appear in logical sequence of size etc. Skil Corp.

419 Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

420 Industrial Wrenches Hand Tools—Tools for production lines, maintenance work and product servicing are presented in 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and rollcabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

421 Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use in attaching pre-drilled fixtures. Remington Arms Co., Inc.

422 Machine Mounts—A vinyl cork, sisal machine pad and an adjustable

35 new models!

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This complete new line of Lift Trucks has simply "outdone" all competition. They are built the sturdiest and priced lowest!! Available in battery operated or hand operated models.

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- *Epoxy Flooring —for problem floors*

Keep factory and other work floors comfortable and accident free with these Flintkote Flooring Products—all are trowel finished.

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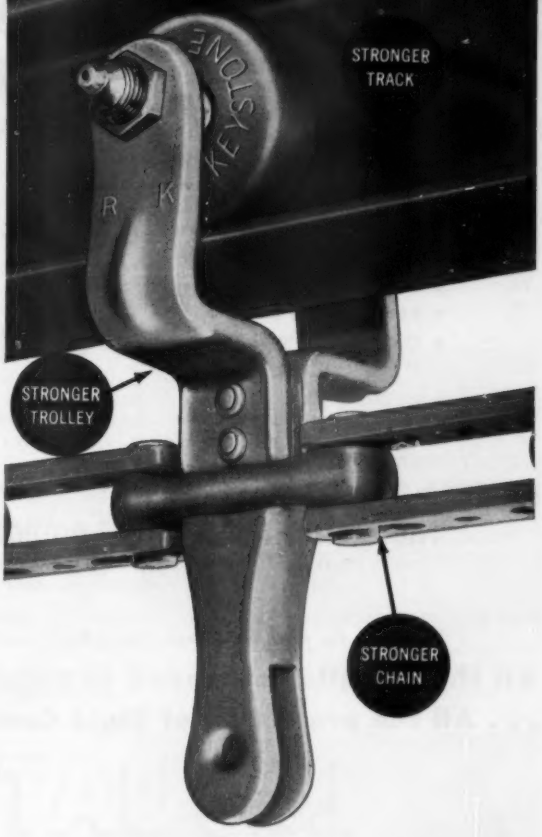

RAPISTAN-KEYSTONE is the quality leader in light-to-medium-duty overhead conveyor

When you can make two do the work of three or four, that's economy — and smart management. Rapistan-Keystone builds 2" overhead conveyor to give you that kind of service. Specially rolled 2⅜" "I" Beam track makes possible unusually tight turns and vertical bends. Rugged R-K trolleys handle loads up to 135 lbs. per trolley. And the patented R-K chain is stronger — with a 10-to-1 safety factor. Standard drives up to 600 lbs. chain pull capacity. Let us show you the savings you can make in initial cost and maintenance with Rapistan-Keystone overhead conveyor.

HERE'S PROOF OF PERFORMANCE

Write for illustrated reports of Rapistan-Keystone 2" overhead conveyor doing jobs usually reserved for heavier systems.

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Give You the Answers

With as many as 20 pens writing on a moving chart, the *E-A Event Recorder* gives you a permanent record of such important facts as:

- when events occur,
- how frequently they occur,
- how long they last,
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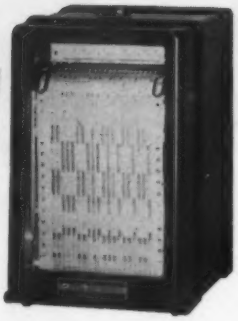

Such data is extremely helpful in establishing and maintaining cycles of automatically controlled operations and processes . . . recording life tests and time of failure . . . positions of valves and levers, etc.

Send for Catalog Section 50 and see how E-A Event Recorders can help you.

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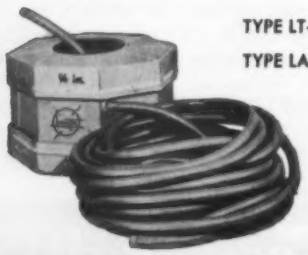
Complete protection against any and all contamination—impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "down-time" due to wiring shorts or burn-outs, no more periodic wiring replacements.



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For more facts circle 707 on Reply Card

DATA FILE

(Begins on page 284)

machine mount for reduction of transmitted vibration and no bolting of machine are described in literature available from the company. Clark-Cutler-McDermott Co.

423 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

MECHANICAL POWER TRANSMISSION

424 Fluid Drive—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables given. Industrial Div., American-Standard.

425 Worm Gear Drive—Bulletin 3050 offers engineering information on right angle gearmotors, in ratings of ⅓ to 30 hp, single reduction, with output speeds of 23 to 280 rpm. Cutaway view showing component features, as well as specifications and dimensional diagrams are included. The Louis Allis Co.

426 Power Transmission Machinery—Comprehensive selection information for power transmission machinery, including V-belt drives, sheaves and belts, is presented in this 110-pp engineering manual, Bulletin A661. Describes construction and design features, and includes complete selection tables, specifications and price lists, and photos and sectional drawings. Dodge Mfg. Corp.

427 V-Belts and Fasteners—Bulletin V-227 contains 6 pp of detailed information on V-belts and V-belt fasteners. Describes use of fasteners with open-end V-belting, how to determine belt lengths, and includes V-belt replacement charts, and other data. Flexible Steel Lacing Co.

428 Transmission Belting—Application information on company's line of transmission belting is presented in 16-pp Bulletin S-5174. Specific types of belting for a variety of applications is illustrated and described, and technical data tables, and a selection table for drives included. The Goodyear Tire & Rubber Co.

429 Packaged Speed Control—Bulletin 20,000, 8 pp, describes a line of packaged speed control drives which incorporate power conversion equipment for converting a-c to d-c power. Advantages are detailed and component features described. The Clark Controller Co.

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"Open Sesame" to clean boilers and furnaces!
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If you burn coal *OXI Crystals will increase boiler efficiency* by getting rid of slag, firescale, encrusted carbon and soot *fast* . . . all combustible deposits are completely oxidized from firedoor to the top of the stack . . . all this with very little labor involved.

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It pays to Specify

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- No rusting or corroding
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ANCOR FLOOR PLATES BY WHEELING

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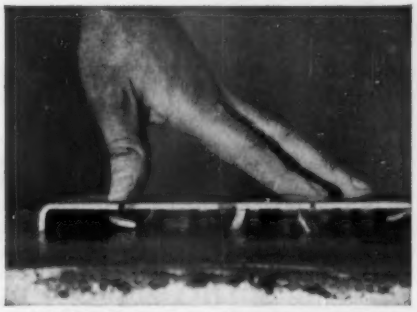
Remove loose flooring material and pour a 1½" to 2" layer of fresh concrete.

2



While it's wet, position Ancor Plates and gently tap them to proper level.

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Let concrete harden around the 53 steel anchors on each plate. Floor's ready!

3 steps to a permanent steel floor

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IT'S WHEELING STEEL

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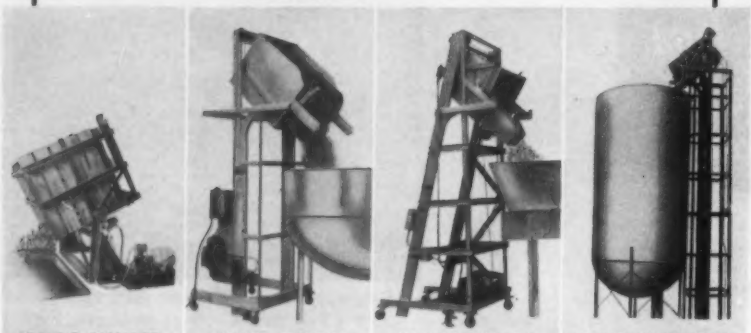
NOW YOU CAN LIFT and DUMP ANY CONTAINER



HYDRO-DUMPER Dumps up to 4 feet. Load capacity, 6000 pounds.

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SENIOR DUMPER Dumps up to 20 feet. Load capacity, 4000 pounds.

VERTICAL DUMPER Dumps to any practical height. Load capacity, 4000 pounds.

Yes, no matter what size, shape or type container you use to receive, store or process free-flowing material — or whether it's a special in-plant container — ESSEX can supply the necessary dumper.

ESSEX dumpers are flexible in design so they can be modified to suit **your** job conditions. For the safe, reliable, economical way to lift and dump material in any container, call upon ESSEX for the answer.

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and many others

Fig. 4124
Heavy Duty Pump

Have problems of handling liquids and semi-solids of a corrosive nature, or where contamination is not permitted? Viking Rotary Pumps made of alloys to fit the need, will answer those pumping problems.

Available in a capacity range from ¼ to 300 G.P.M. and larger. New induction melting foundry facilities mean rigid control and faster delivery of the complete line of Viking alloy pumps.

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VIKING — The Leader not a follower in Rotary Pumps

VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

See Our Catalog in Sweet's Plant Engineer's File

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DATA FILE

(Begins on page 284)

430 Worm Gear Reducers—Complete horsepower and torque data for company's worm gear units built on 2½ up to 4-in. centers are given in full-page tables in Bulletin 5018. Dimensions are diagrammed and tabulated in detail, and materials and design of interchangeable components are described. De Laval Steam Turbine Co.

431 Anti-Friction Bearings—Catalog 424-B, entitled "The broadest line in the anti-friction field," is an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

432 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings. Thomas Flexible Couplings Co.

433 Coupling Data—An integrated selection of product bulletins and data on company's line of couplings for a variety of industrial applications is presented in this handy ring-bound notebook. The notebook contains sections on product literature, engineering data, instruction sheets, application data, and price lists. To all of these sections, additional material can be added as it becomes available. Koppers Co., Inc.

SEALS, PACKING

434 Mechanical Seals — Precision mechanical seals for almost every rotating shaft sealing problem are described in this bulletin. Design features are illustrated with cutaway views. Borg-Warner Corp.

435 Internal Mechanical Seal—Bulletin CP-575 features Chemical & Power internal seals styles IUA and IUB. They are recommended for use at pressures from 28" Hg vacuum to 100 psi and from—80 to 500 F. Chemical & Power Products, Inc.

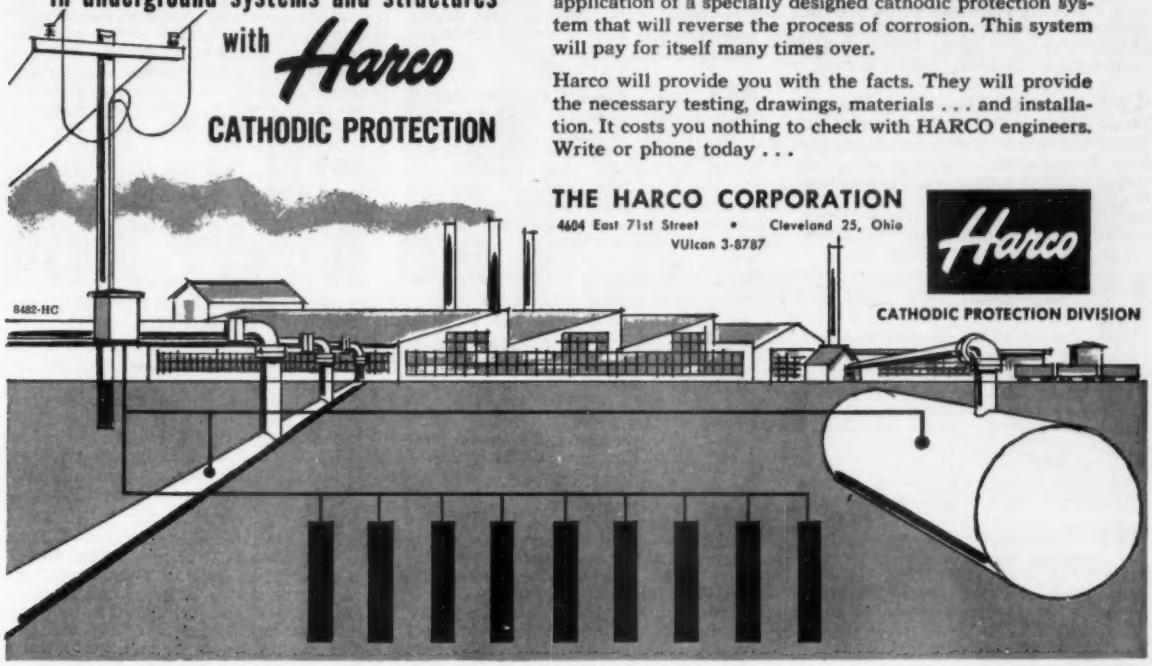
436 Rubber Seals—This 24 pp Fact Book provides selection and installation information on company's Quadring and O-ring seals. Diagrams showing details of design are included, as well as specifications and information about media in which various rubber compounds can be used. Minnesota Rubber Co.

437 Too Hot to Handle? — Described in illustrated Catalog 480 is a circulating seal designed to reduce temperature of liquid in stuffing box. Cutaway view and diagram illustrate design and construction features of the circulating ring which provides circulation of liquids to maintain temperatures. Durametallic Corp.

438 Self-Lubricating Packings — Featured in this 30-pp Bulletin PC-

STOP COSTLY CORROSION

in underground systems and structures with *Harco* CATHODIC PROTECTION



If you have buried or submerged metal structures (pipe lines, oil and water storage tanks, etc.) CORROSION is costing you money!

The corrosion can be stopped. Not by magic . . . but by the application of a specially designed cathodic protection system that will reverse the process of corrosion. This system will pay for itself many times over.

Harco will provide you with the facts. They will provide the necessary testing, drawings, materials . . . and installation. It costs you nothing to check with HARCO engineers. Write or phone today . . .

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Harco
CATHODIC PROTECTION DIVISION

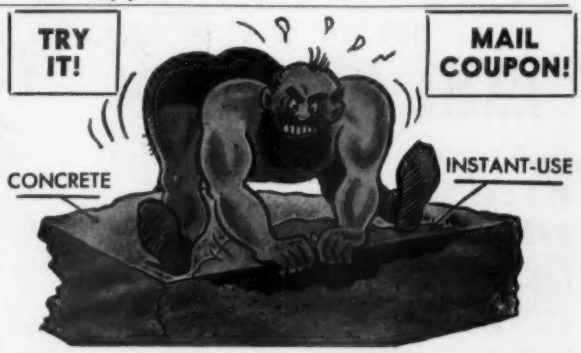
Dow Magnesium anodes • National Carbon graphite anodes • Duriron anodes • Rectifiers • Cadweld brazing equipment • Polyken tape . . . and other materials.

For more facts circle 713 on Reply Card

The easiest—and quickest—way to order bulletins and catalogs described in this magazine is to use the postage-free Reader Service Cards on pages 279-280.

All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address—and mail the card.

You may also use the Reader Service Cards to request information on products described, or literature mentioned in the ads—just circle the number below the ad.



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Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete . . . right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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DATA FILE

(Begins on page 284)

103 is detailed information on company's line of packings with internal lubrication. Application chart, table of physical properties, and ordering instructions. Greene, Tweed & Co.

439 Metal Packing — Featured in 24-pp Form AD-166 is detailed information on selection of metal packings for use wherever gas or air is compressed or expanded. Covers free-floating metal packings, metal rod packing rings, metal scraper rings, metallic or non-floating packings, rings. The Garlock Packing Co.

ELECTRICAL

440 Portable Distribution System—Described in this 30-pp Catalog PC-58 is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System diagrams showing how each unit fits are included. Whitney Blake Co.

441 Drip-Proof Motors — Bulletin 857 contains 12 pp of detailed information on company's line of open drip proof and totally enclosed fan cooled motors. Construction features are described and tables of engineering data and specifications included. Brook Motor Corp.

442 Mill Motor — Design features of company's 620 frame mill motor are detailed in illustrated Bulletin PB 9000-2. Electrical details are described, including design and construction of armature, armature coils and field coils. Mechanical design features are also covered. Crocker-Wheeler Div., Elliott Co.

443 Motor Control Centers—Maximum protection motor control centers with circuit isolation are described in this 33-pp technical design data book. Advantages and features are detailed and technical data required to engineer and specify the motor control centers are included in special fold-out sections which include typical specifications, cell layout tables, starter data, and wire tables. Northeastern Engineering, Inc.

445 Power Circuit Breakers—Individually enclosed low-voltage power circuit breakers are described in 8-pp Bulletin 4261-2B. Information includes design, installation and safety features, enclosure dimensions, ratings, application and selection charts. I-T-E Circuit Breaker Co.

447 Protective Relays—Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications. Federal Pacific Electric Co.

448 Protective Equipment Guide—Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is besed on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables. Bussmann Mfg. Co.

449 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

450 Electrical Equipment—Twelve-pp pictorial Bulletin 2706 describes fabrication and applications of company's electrical equipment, including conduit fittings, electrical equipment enclosures and devices, floodlights and traffic control. Photos show installations. Crouse-Hinds Co.

451 Electrical Equipment — Condensed Catalog No. 9 contains 48 pp of descriptive data of company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

THIS

NAGLE PUMP

resists the "Grinding Wheel" abrasion of ash laden water

Disposal of ash from boilers by pumping is as practical as electric light. BUT a slurry of ash and water is highly abrasive—tough on pumps.

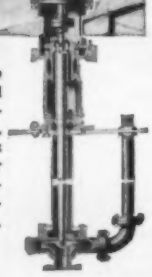
This Nagle 1½" Type "CWO-C" Pump has given excellent, carefree service for over 2 years—handling ash to waste at the Passaic, N.J. plant of a well-known mechanical rubber goods producer.

Tough jobs call for

Nagle PUMPS

FOR ABUSIVE APPLICATIONS EXCLUSIVELY

There are no submerged bearings, no rubbing contact between revolving and stationary parts below the radial bearings, no stuffing box to give trouble, nothing to bind or clog. Many plants operating boilers use Nagle Pumps for ash disposal. Send for Nagle Pump Selector. Representatives in principal cities. Nagle Pumps, Inc., 1267 Center Ave., Chicago Heights, Ill.



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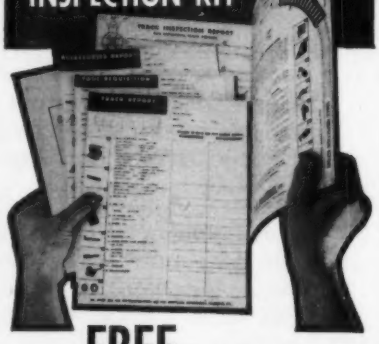

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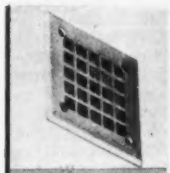


SIGNAL HORN

These are only 3 of 18 possible installation variations.

The basic horn (illustrated), with the addition of modular accessories also provides for flush installation, single or dual projector models, for surface mounting outdoors and for surface, semi-flush or concealed conduit installation indoors. The horn is self tuning, capable of withstanding continuous duty and may be adjusted for volume.

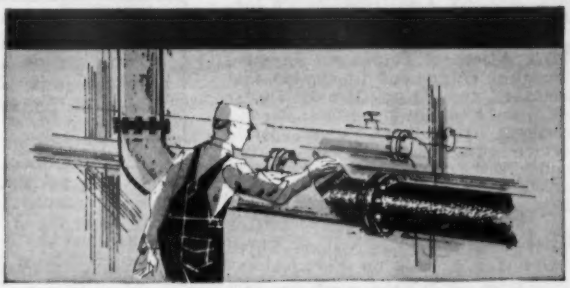
This horn can cover the majority of your signalling requirements. Ask for the FEDERAL Bulletin on the Vibratone.

FEDERAL SIGN and **SIGNAL** Corporation
13615 S. Western Ave.,
Blue Island, Illinois

For more facts circle 719 on Reply Card

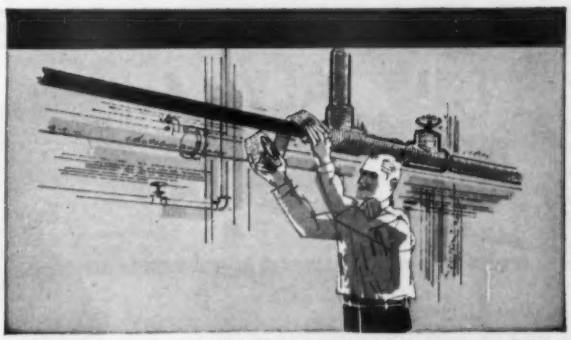
END ALL DRIP AND RUST PROBLEMS IN YOUR PLANT THESE TWO PROVEN WAYS!

Industrial plants know Mortell products offer more positive protection than any other drip-and-rust preventive. Maintenance men know that paints or compounds of paint and fish oil provide little or no permanent protection. Rust-inhibiting NoDrip Plastic Coating is a moisture-proof insulation that *does* stop condensation . . . forms a seamless jacket . . . *does* stop corrosion. NoDrip Tape, with its triple insulating barrier, is equally dependable.



For Tanks, Large Pipes, Air Ducts, Metal Equipment, Walls, Ceilings, Permanently End Condensation Drip, Rust and Corrosion With NoDRIP PLASTIC COATING

The heavy consistency of NoDrip outlasts many coats of paint or ordinary rust-preventives. Permanently insulates and protects. Applies easily with trowel, brush or special spray. Nontoxic, odorless and non-flammable. Resists acid, alkali, brine solutions or vapors. Available in 1, 5 and 55 gallon drums.



For Smaller Pipes or Tubing, Permanently End Condensation Drip, Rust and Corrosion With NoDRIP TAPE

An easy-to-use, wrap-around pipe covering, perfectly pliable, cork-filled, completely self-adhering. Forms an air-tight, 100% vapor- and moisture-proof jacket. Fits snugly even around tees, unions, angles, valves. Cuts maintenance costs—makes out-of-the-way storage areas useable—ends slip and slide floor hazards. No need for vapor seals, brads, fasteners or tools of any kind.

At all leading hardware, mill supply and plumbing jobbers. For complete information and technical handbook, write

Mortell COMPANY
597 Burch Street · Kankakee, Illinois

For more facts circle 720 on Reply Card

DATA FILE

(Begins on page 284)

tors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

452 Distribution Equipment—Detailed information on company's line of electrical distribution equipment is presented in 82-pp '59 Marketeer, Catalog M-159. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

453 Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

454 Trolley Busway System—Three bulletins offer help on electrical installations involving cranes and hoists, assembly and production lines, test lines and other moving electrical equipment. Bulletin 60, 40 pp, covers 60 amp systems; Bulletin 70, 32 pp, covers 225-500 amp systems; Bulletin 75, 44 pp, covers 100 amp systems. Each includes special section on installation planning and procedure, mounting. Feedrail Corp.

455 Flexible Electric Conduit—Performance and application data on company's line of flexible plastic covered electrical conduit, liquatite, are featured in this illustrated brochure. Electri-Flex Co.

456 Insulated Cable—"How to choose insulated cable" is the subject of humorously illustrated 22-pp Bulletin 1117. Basic considerations to keep in mind when selecting insulated cable are stressed, and essential facts about construction components are presented. The Okonite Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 279 and 280.

457 Portable Electrical Cable—Detailed information on portable electrical cable for a variety of industrial applications is presented in this condensed catalog. Basic construction covered. Western Insulated Wire Co.

459 Wiring Devices—Catalog 60, about 80 pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

461 Enclosed Switches—Catalog 83, 22 pp, Catalog 84, 16 pp, and Catalog 101, 24 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

462 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters are used. Allen-Bradley Co.

463 Oil-Tight Pushbuttons—Illustrated in full color, 30-pp Publication EL-178 presents company's line of oil tight pushbuttons, indicating lights, selector switches, Roto-Push buttons,

for DROP-TIGHT CLOSURE
THIS VALVE
EXCELS!

Whether the need be for drop-tight or bubble-tight shutoff—with Rockwell rubber-lined butterfly valves you're always sure of positive sealing. Liner may be of natural or synthetic rubber to suit conditions.

- Valve sizes—4" to 72" and larger.
- Pressures—as high as 700 psi.
- Construction—of any required metals.
- Control—manual or automatic.

Write for Bulletin 582

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RUBBER-LINED
BUTTERFLY VALVES

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY
Valves—Butterfly · Slide · Diaphragm · Special
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HELP WANTED

PLANT ENGINEER

Midwestern bakery firm, a leader in its specialty field, and characterized by an impressive record of growing customer acceptance of its products and by modern, efficient methods is seeking a qualified plant engineer.
The "right man" for this position will possess five to ten years of increasingly responsible operating experience with a food processing plant of at least 200,000 square feet and employing around 400 people. He must be qualified to handle both administration and direct engineering involved in plant layout and design in the specification installation and maintenance of high-speed production equipment, and in the liaison with contractors and sub-contractors; he will also direct the mechanical and electrical crafts, and be responsible for both protective and daily maintenance.

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RESEARCH & DEVELOPMENT
ENGINEERS & FABRICATORS
In Stock for Prompt Shipment
SEMI-STEEL LAYOUT PLATES & TABLES
WELDING PLATENS, BENDING BLOCKS
High Tensile Strength
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ACORN IRON & SUPPLY CO.
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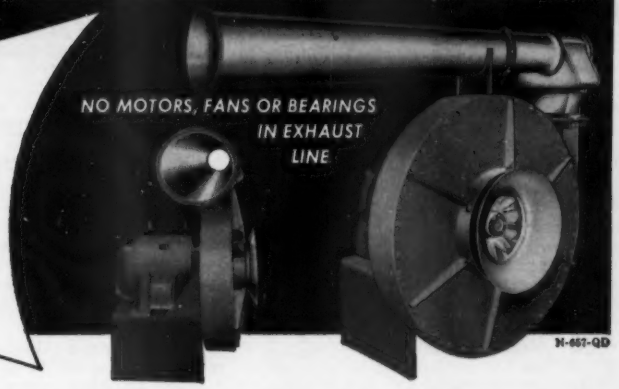
Now . . .

you can reduce bulk materials handling costs with *Quickdraft* high pressure exhausters



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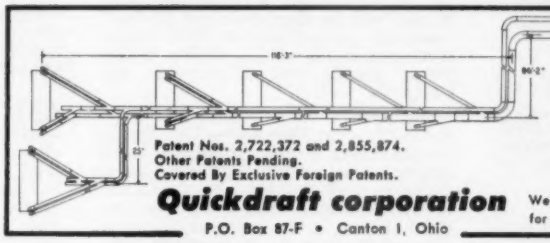
Cement, Sand, Iron Oxide, Wheat, Corn, Salt, Limestone, Castor Beans, Knots, Blocks, Paper, Wool, Cotton, Oats, Rags, Rubber, Vegetables, Coal (Powdered), Shavings, Cork, Sawdust . . . **and any other materials that can be moved by air!**

IMPORTANT NOTICE
For resisting abrasive action, Quickdraft units can be rubber lined. For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (PVC), and with plastic and Fiberglas coatings.

Time and maintenance savings usually pay for Quickdraft high-pressure exhausters in 6 to 18 months on materials handling jobs. Because material does not pass through blower, maintenance is negligible. Downtime for cleaning and replacing fans, motors and bearings is eliminated. Quickdraft units are also ideal for exhausting paint spray, abrasives, corrosive gases, noxious fumes and high temperatures. For Quickdraft engineering data on materials handling, industrial exhausting, heating plant venting, write today!



Patent Nos. 2,722,372 and 2,855,874.
Other Patents Pending.
Covered By Exclusive Foreign Patents.

TYPICAL EXAMPLE: Ideal for moving trim from paper, cellophane and plastic slitting machines. (Models range from 4 in. to 30 in. diameter — with 1/6 to 600 H.P. motors — with negative static pressures from 1/4 in. to 60 in. W.G.)

Quickdraft corporation
P.O. Box 87-F • Canton 1, Ohio

Well known for power draft units for all types of heating plants.

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One of a series

Say Engineer, When You Mean Engineer

Somehow it's become popular to speak of science and technology—popular, that is, with everyone but engineers.

Engineers are in a partnership with scientists in this great industrial nation of ours—designing its products, constructing its communications, and even producing its missiles.

The U. S. is reaping fruits of a highly developed technology—a vast body of engineering and scientific know-how. And the fellows with that know-how are scientists and engineers.

So when you speak of these fellows—or write of them—call them what they call themselves. Call them engineers.

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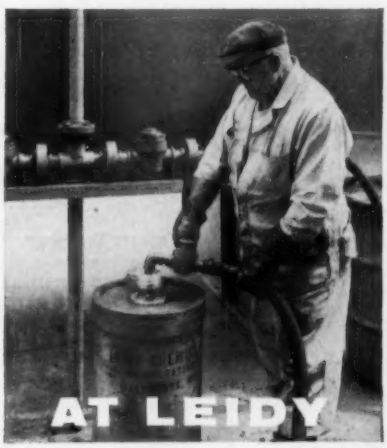


Use of UPVC (unplasticized polyvinyl chloride) piping results in substantial cost savings in handling ferric chloride at Leidy Chemical Corporation, Baltimore. Here, ttp products include elbows, flanges, tees, plug valves.

Here's data on UPVC piping

You, too, can cut costs with UPVC piping . . . and we can help you! Valuable information on properties, applications and installation procedures is given in ttp Catalog 119. Also describes full line of ttp fittings, flanges, valves and specialties. Write for free copy.

TUBE TURNS PLASTICS, INC.
Dept. PE-9, 2929 Magazine Street
Louisville 11, Kentucky

For more facts circle 724 on Reply Card

DATA FILE

(Begins on page 284)

covers and enclosures and accessories. All models are pictured along with selection charts, ordering information. Cutler-Hammer, Inc.

464 **Control Batteries**—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

466 **Electrical Equipment**—Collected in this bound catalog is a series of bulletins on company's line of electrical equipment, including electric motors, generators, motor-generator sets, switchboards and controls. Cutaway views showing details of design and construction are included, as well as engineering and specification. The Ideal Electric & Mfg. Co.

468 **Commutator Maintenance**—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them. Ideal Industries, Inc.

469 **Pressure Transducer** — Specification Sheet PE-5000B describes a current feedback, torque balance pressure transducer having low drift qualities. Includes description of operation, as well as specifications and application details, diagrams. Hagan Chemicals & Controls, Inc.

OTHER EQUIPMENT

471 **Molybdenum in Steel Castings**—This 36-pp brochure on the role of molybdenum in steel castings for industrial equipment discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance, machinability, and weldability of cast steels. Climax Molybdenum Co.

473 **Industrial Finishing Equipment**—Catalog A657, 12 pp, describes modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

474 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

475 **Product Directory**—This Product Directory G-103 provides a basic source of information on company's divisions and products. Products are divided into major sub-groups—chain link fence, chemicals and coke, springs, belts, wire, wire cloth, etc. The Colorado Fuel and Iron Corp.

476 **For Cleaner Furnace**—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recent pamphlet. Oxi Corp.

477 **Industrial Burners** — Advantages of company's industrial burners are detailed in illustrated Bulletin 3. A number of different types for a variety of applications are described and data tables are included. Industrial Combustion, Inc.

478 **Plastic Tapes**—Featured in this product bulletin are plastic tapes for a variety of industrial and other applications. Uses described include lane marking, color coding and decorating, holding and protecting, and for masking and protecting. Minnesota Mining and Mfg. Co.

480 **Fire-Resistant Fluids** — This series of specification sheets describes company's line of fire-resistant fluids, including synthetic, oil-water emulsion, and glycol types. Physical characteristics and other data on each included. Socony Mobil Co., Inc.

481 **Mechanical Steel Tubing**—Electric-resistance welded mechanical steel tubing for a variety of industrial applications is featured in 8-pp Bulletin RCP-960. Photos showing tubing subjected to various tolerance tests are included, as well as details on fabrication and specifications. Rome Cable Corp.

WRIGHT Safeway Hand Hoists—In 12 Sizes —½ Ton to 50 Tons

WRIGHT Safeway Hand Hoists are built to take it—inside and out. Sealed construction protects all vulnerable parts in high analysis steel housing. Gears, pinions, drive spindle (also top and bottom hooks) are nickel-chrome-molybdenum alloy steel mounted on anti-friction bearings. Gear train is enclosed in oil-tight chamber. Load wheel, with 5 or more pockets, can be reversed for double life. Alloy steel load chain is heat treated to resist wear, ductile to withstand shock loads. Weston type load brake. Factory tested at 50% overload. Write to our York, Pa., office for Bulletin DH-164C.

WRIGHT HOISTS

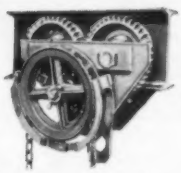
Wright Hoist Division • American Chain & Cable Company, Inc. ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 725 on Reply Card

Smooth-Running Timken Roller Bearing Trolleys

Plain Timken Trolley



Geared Timken Trolley

WRIGHT Timken Roller Bearing Trolleys (shown), in plain or geared models, provide smooth, safe handling of ¼ ton to 40 ton loads with minimum of effort. Heavy steel side plates and chilled tread wheels revolve on Timken Bearings (two bearings to each wheel). Tapered bearing design absorbs both thrust and radial loads and thereby reduces the work required to move the trolley along I-Beam. Chilled wheel treads wear longer, assure wheel roundness. Wright Self Aligning Roller Bearing Trolleys in ½ ton to 20 ton models are also available.

Write to our York, Pa., office for Bulletin DH-242-B

WRIGHT TROLLEYS

Wright Hoist Division • American Chain & Cable Company, Inc. ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 726 on Reply Card

482 **Paint Finishing Systems** — A series of six articles on paint finishing systems is presented in this 20-pp bulletin. Articles cover conveying systems, system layout, equipment for metal preparation, ovens, methods of paint application, and auxiliary equipment. J. O. Ross Engineering Div., Midland-Ross Corp.

483 **Thermoplastic Polymer** — Information on the properties of Penton, thermoplastic polymer, is presented in this 6-pp brochure. Lists mechanical, electrical and chemical properties and describes molding methods. Hercules Powder Co.

484 **Reproduction Materials**—Provided in this 20-pp illustrated Booklet FI-101, on Kodagraph reproduction materials is a comprehensive materials selection chart designed to aid in finding material best suited to any reproduction job, from printed halftones, microfilm, and drawings with fine detail to soiled drawings and those in bad condition. Rest of booklet presents company's films, papers. Eastman Kodak Co.

485 **Silicone Products** — The 1959 Reference Guide to company's silicone products tells which silicones can best meet the needs of a variety dielectrics to water repellents. Con- of problems ranging from adhesives to release agents, resins to rubbers, tains graphic examples of typical applications, as well as detailed selection data. Dow Corning Corp.

486 **Release Agent**—Technical Bulletin 19 describes a release agent which can be rubbed to an imperceptible film for easy parting of epoxy resin castings from plaster molds, or from metal, wood, or epoxy masters. Covers methods of applying the material and includes prices. Smooth-On Mfg. Co.

487 **Industrial Equipment**—Featured in this 51-pp Bulletin is a line of equipment manufactured by this company, including such items as air releases, can filters, capacitors, circulating lubrication systems, rate of flow controllers, dispensing outfits, filters, indicators, lubricating units, meters, oilers, pumps, valves, and other products. Applications stories are included. Bowser, Inc.

488 **Insect Control**—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles. West Chemical Products, Inc.

489 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on uses. J. A. Sexauer Mfg. Co., Inc.

490 **Industrial Stack**—Detailed information on a permanent, low cost refractory smoke stack for commercial and industrial applications is contained in 8-pp Bulletin IS-32. Gives product information, applications with boilers, furnaces, etc. Van-Packer Co., Div., The Flinkote Co.

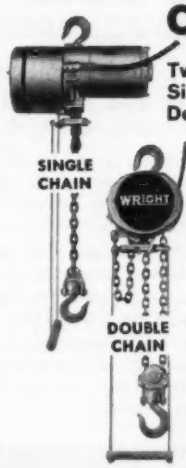
491 **Draft Starter** — Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

492 **Fighting Corrosion With Corrosion**—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures. Electro Rust-Proofing Corp.

493 **Cyclone Separators**—Featured in 8-pp Bulletin 712 are company's cyclone separators and pipe line after-coolers designed to provide cool, dry and clean compressed air and gases. Cutaway views illustrate component parts and features, and capacity tables facilitate selection. R. P. Adams Co., Inc.

494 **Water-Cooled Stoker** — Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

Light, Low-Cost Electric Chain Hoists



Two Capacities:
Single Chain–300 to 2000 lbs
Double Chain–3000 to 4000 lbs

The WRIGHT Electric Chain Hoist has fewer moving parts than any other chain-type electric hoist. Result: hoist working efficiency is increased, maintenance costs are decreased. This rugged, compact hoist features a double braking system—self-locking worm gear reduction, easy to adjust motor brake. Hoisting gears are made of high grade phosphor bronze—worms are heat treated alloy steel. All gears operate in a continual oil bath. Alloy load chain is wick lubricated for long life, heat treated for resistance to wear. Factory tested at 50% of overload.

Write to our York, Pa., office for Bulletin DH-73B

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc. ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

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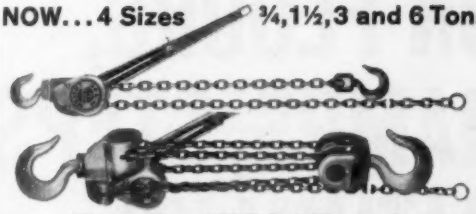
New ¾-ton Type "C" Pull-A-Way

NOW...4 Sizes ¾,1½,3 and 6 Tons



WRIGHT Type "C" Pull-A-Ways make easy work of hundreds of quick hook-up jobs. Now available in four sizes—¾, 1½, 3 and 6 ton—Type "C" Pull-A-Ways are portable, safe and rugged. Corrosion-resistant modern aluminum alloy castings are used for gear case, handle and covers of all models. Hooks, load chain and chain sheave are made of alloy steel. Positive, dependable load brake securely holds load at any point. Lubricated for life. Weights: ¾-ton, 14 lbs; 1½-ton, 23½ lbs; 3-ton, 36½ lbs; 6-ton, 63 lbs.

Write to our York, Pa., office for Bulletin DH-56A

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc. ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

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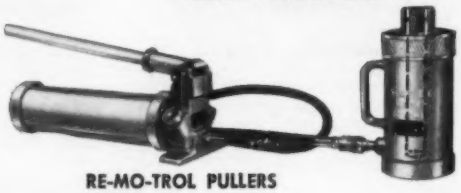
81 hydraulic models to choose from!
THE WORLD'S MOST COMPLETE LINE

SIMPLEX
HYDRAULIC JACKS and PULLERS

STANDARD HYDRAULIC JACKS
11 Models
1½ to 100 tons capacity
5⅛" to 22" travel

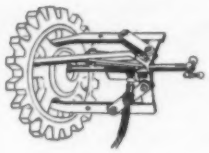
"JENNY" CENTER-HOLE HYDRAULIC PULLERS
6 Models
30 to 100 tons capacity
3¼" to 10" travel

ROL-TOE FOOT-LIFT HYDRAULIC JACKS
3 Models
10 to 50 tons capacity



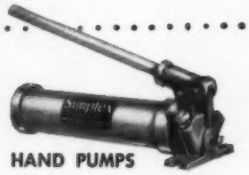
RE-MO-TROL PULLERS
Solid and Center-Hole Rams
39 Models
10 to 300 tons capacity

HYDRAULIC SERVICE and BUMPER JACKS
9 Models
1¼ to 20 tons capacity
13½" to 19" travel



HYDRAULIC PULLERS
4 Models
20 and 30 tons capacity
Push-Pullers, Double and Triple-Grip Pullers

POWERED PUMPS ELECTRIC, GAS OR AIR – 6 Models



HAND PUMPS
3 Models

Look for further information on Lever and Screw Jacks in other advertisements.

TEMPLETON, KENLY & CO.
2561 Gardner Road
Broadview, Illinois

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STOP SLIPPING ON FLOORS, RAMPS, STEPS, CATWALKS...trowel on Flintdek*!

- Available in tile red, green, blue, cement gray and high visibility yellow for all walking areas.
- Resists water, gasoline, oil, alcohol, fats, dilute acids and alkalies.
- Doesn't chip, crack or peel over metal, wood or concrete. Covers 50 sq. ft. per gallon.

For particulars on Flintdek safety coating write: The Flintkote Company, Industrial Division, 30 Rockefeller Plaza, New York 20, N. Y.

*Reg. U.S. Pat. Off.

FLINTKOTE

Manufacturer of America's Broadest Line of Building Products

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BOWSER

PORTABLE WHEEL TANK

TRANSPORTS LIQUIDS . . . . QUICKLY . . . . SAFELY

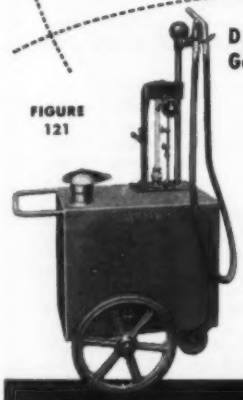

FIGURE 121

DISPENSES AND REGISTERS Gallons, ½ Gallons, Quarts, Pints

Oils, solvents, process liquids . . . are all transported quickly, easily, safely . . . and dispensed accurately in controlled quantities. A piston-type measuring pump with counter records up to ten gallons and repeats or resets. Protecto-Seal fill-and-vent with built-in flame arrestor assures safe handling of flammable liquids. Anti-drip nozzle. 50-gallon tank. Convenient delivery hose.

ALSO AVAILABLE . . .

Figure 63	Figure 172	Figure 41	Figure 109
Measures quart, pint, or ½-pint. Anti-drip nozzle. Pump is lockable. 65-gal. tank.	Completely enclosed. Hinged, lockable cover. Same pump and tank as Figure 63.	Floor stand pump for low-level tanks. Measures gals., ½ gals., qts., pints. Lockable.	Dispenses and records gal., ½ gal., qt. and pt. quantities. 65 or 120-gal. tank.

BOWSER, Inc., 1381 EAST CREIGHTON AVENUE FORT WAYNE, INDIANA

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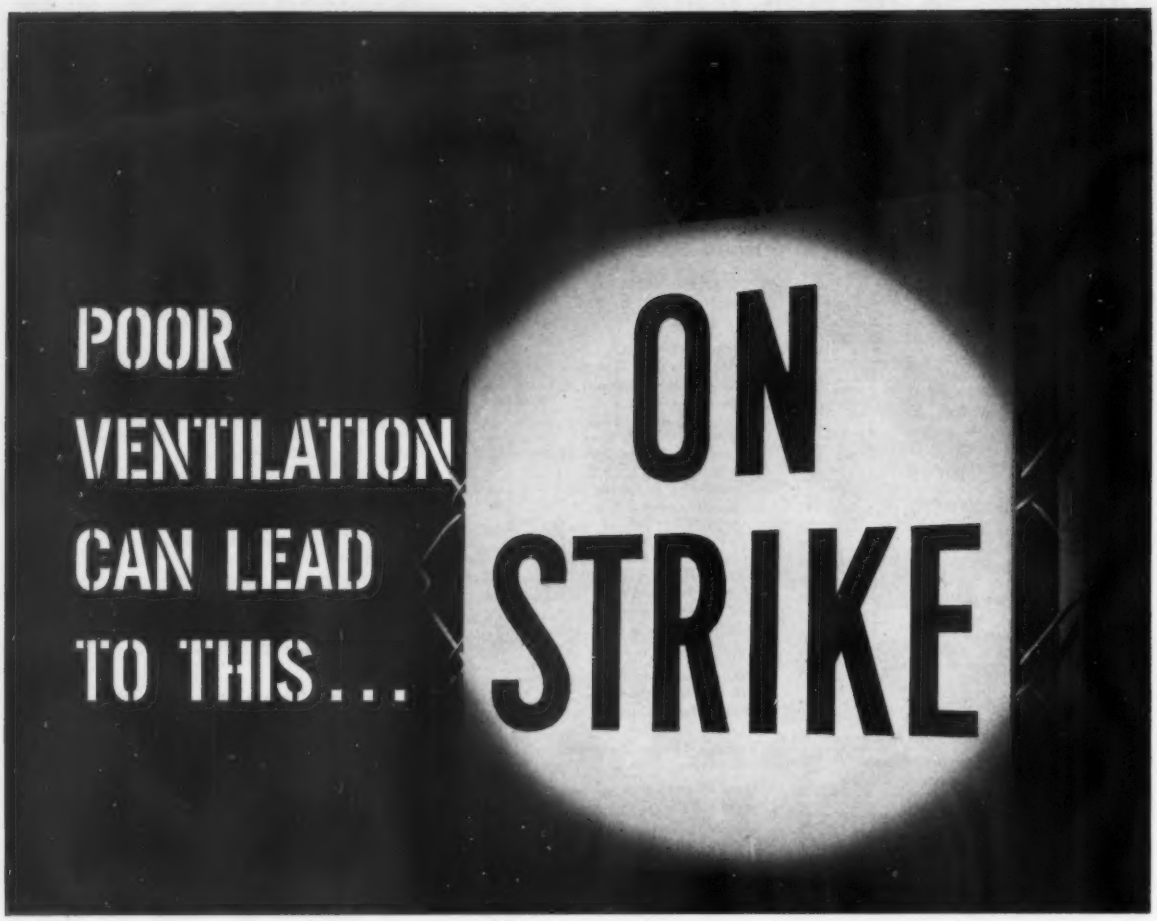

Hartzell ventilation can help prevent it

Bad ventilation is seldom the sole cause of a labor dispute, but it's often a contributing factor. Unpleasant working conditions are bad for morale. Smoke, heat and fumes cause discomfort . . . and discomfort breeds discontent.

Effective control of heat, smoke and fumes, can do wonders for morale . . . and for production efficiency. Good working conditions mean good spirits . . . and a minimum of accidents, errors and absenteeism.

Whether you're concerned with the operation of an existing plant or the design of a new one, Hartzell's complete line includes the equipment you need to insure effective ventilation. Ask your nearby Hartzell representative for details. If you don't know him, drop us a line for his name and address.

here's a complete line of air moving equipment designed and built specifically for industry

Other famous Hartzell products include controllable and full feathering propellers for light aircraft, crop drying equipment and farm ventilating fans.

HARTZELL PROPELLER FAN COMPANY • **51 Thomas Blvd. Piqua, Ohio**
Div. of Castle Hills Corp. A Member of AMCA Engineering Offices in Principal Cities

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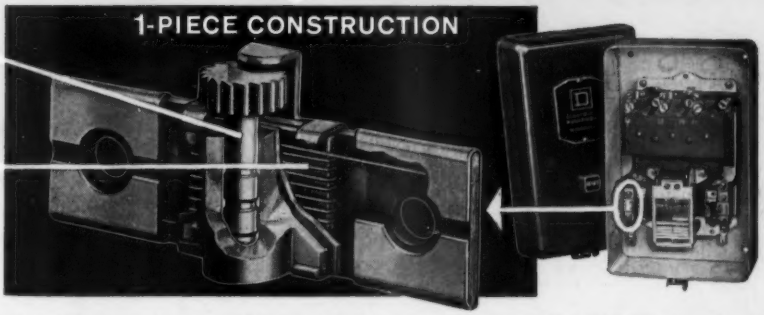
When you buy Motor Starters--

YOU PAY FOR OVERLOAD PROTECTION

...BE SURE YOU GET IT!

Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

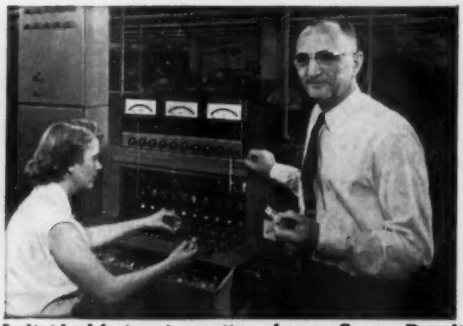


Only ONE-PIECE Overload Relays can give 100% Protection Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your starters will not operate without the thermal units properly installed. Only with ONE-PIECE construction can you *know* your motors have full protection.

Only Square D has ONE-PIECE Construction ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect their accuracy.

Insist on Square D starters with melting alloy thermal overload relays

Let your Square D Field Engineer show you 1 how one-piece construction is accomplished and how easy it is to mismatch separate heaters and solder pots— 2 an endurance tester to prove that overload units can be reset repeatedly without damage while the solder is liquid — 3 a tripping time tester to compare various types of melting alloy units and to prove that tripping time won't change after repeated operation.



Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.

***Write** for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin*

SQUARE D COMPANY

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Cut Production Costs with

ULTRAFLEX STATIC POWER

Adjustable Speed Packaged Drives

NO MOVING PARTS Static power conversion units have replaced the conventional M-g set. Ultraflex Packaged Drives save up to 50% in floor area . . . up to 75% in weight, permitting low cost installations or alterations without special handling equipment or floor loading preparations.

NO MOVING PARTS Ultraflex Packaged Drives work perfectly without forced ventilation . . . less power wasted as unwanted heat. No power robbing friction or windage losses. A closed-loop voltage regulation system, current limit control, and static field excitation insure peak operational efficiency.

NO MOVING PARTS Simple static power conversion units cut maintenance costs. With Ultraflex there are *no* bearings, commutators, or brushes to service. *No* shafts to align or couplings to maintain. *No* inertia loads to balance. *No* fans or filters to clean or change.

Standard Ultraflex Drives provide an 8:1 speed range with wider ranges available upon request. Optional features include dynamic braking, jogging, reversing, tachometer-generator speed regulation, etc. Get all the facts, and see how a Cutler-Hammer Ultraflex Packaged Drive can provide outstanding savings in installation, operation, and maintenance. Write today for new bulletins EN64-S-274 and EN65- Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

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